Instructions - Parts

Pro Xp Auto Waterborne Air Spray Gun

333012B
EN

Automatic Electrostatic Air spray gun for use when electrostatically spraying conductive waterborne fluids that meet at least one of the following conditions for non-flammability:

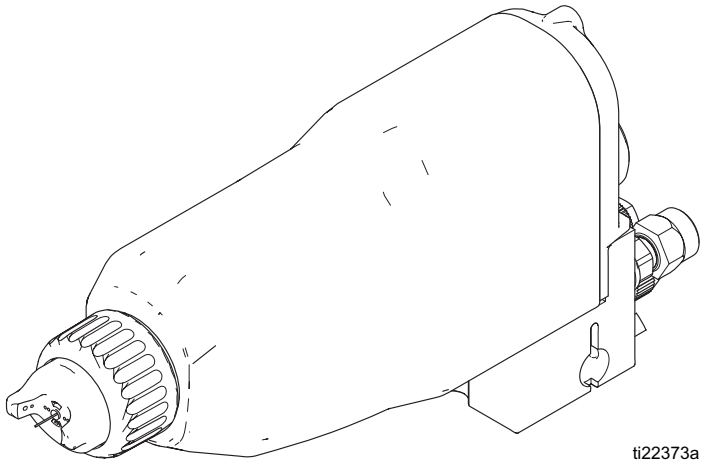
- **Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.**
- **Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.**

For professional use only.

100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Pressure
100 psi (0.7 MPa, 7 bar) Maximum Working Fluid Pressure

Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

See page 2 for **Table of Contents** and page 3 for **List of Approved Models**.



ti22373a

Table of Contents

List of Approved Models 3
Related Manuals 3
Warnings 4
Introduction 7
How the Electrostatic Air Spray Gun Works 7
Operating the Spray Function 7
Operating the Electrostatics 7
Gun Features and Options 7
Smart Gun Features 7
Spraying Waterborne Fluids Electrostatically 8
System Overview 9
Gun Overview 10
Installation 11
System Requirements 11
Install the System 11
Warning Signs 11
Ventilate the Spray Booth 11
Install the Air Line Accessories 12
Install the Optional Fluid Line Accessories 12
Install the Gun 14
Install the Pro Xp Auto Control Module 14
Connect the Air Line 14
Ground the Cabinet 14
Manifold Connections 15
Connect the Waterborne Fluid Hose 16
Fiber Optic Cable Connection 18
Agitator Kit Accessory 19
Fluid Regulator Kit Accessory 19
Grounding 20
Check Electrical Grounding 20
Install the Fabric Cover 22
Check Fluid Viscosity 22
Flush Before Using Equipment 22
Operation 23
Operating Checklist 23
Fluid Voltage Discharge and Grounding Procedure . . 24
Pressure Relief Procedure 24
Fill the Fluid Supply 24
Select a Fluid Nozzle and Air Cap 25
Operating the Spray Function 25
Adjust the Spray Pattern 25
Adjust the Electrostatics 26
Spraying 27
Triggering the Fluid Alone 27
Shutdown 27
Maintenance 28
Daily Care and Cleaning Checklist 28
Flushing 28
Clean Outside of Gun 29
Clean the Air Cap and Fluid Nozzle 29
Check for Fluid Leakage 30
Clean the Cabinet 30
Electrical Tests 31
Test Gun Resistance 31
Test Power Supply Resistance 32
Test Electrode Resistance 32
Test Ground Strip Resistance 33
Test Cylinder Resistance 33
Troubleshooting 34
Voltage Loss Troubleshooting 34
Spray Pattern Troubleshooting 37
Gun Operation Troubleshooting 38
Electrical Troubleshooting 39
Repair 41
Prepare the Gun for Service 41
Remove the Gun from the Manifold 41
Install the Gun on the Manifold 41
Air Cap/Nozzle Replacement 42
Electrode Replacement 43
Fluid Packing Removal 43
Packing Rod Repair 44
Piston Repair 45
Adjust the Actuator Arm 46
Barrel Removal 46
Barrel Installation 47
Power Supply Removal and Replacement 47
Turbine Removal and Replacement 48
Parts 50
Standard Pro Xp Auto Waterborne Air Spray Gun Models 50
Smart Pro Xp Auto Waterborne Air Spray Gun Model 52
Packing Rod Assembly 54
Turbine Assembly 55
Air Caps and Fluid Nozzles 56
Fluid Nozzle Selection Chart 56
Fluid Nozzle Performance Charts 56
Air Cap Selection Chart 58
Isolation Enclosure 59
Tubing and Wiring 62
Agitator Kit 245895 64
Fluid Regulator Kit 245944 65
Shielded Waterborne Fluid Hose 24W597 65
Accessories 66
Dimensions 67
Rear Inlet Manifold 67
Technical Data 68
Notes 69
Graco Pro Xp Warranty 70

List of Approved Models

Part No.	kV	1.5mm Nozzle	Standard Model	Smart Model	Bottom Manifold	Rear Manifold
LA1M18	60	✔		✔		✔
LA1T18	60	✔	✔			✔

Part No.	Description
24X287	WB 100 Isolation Enclosure
24W597	25’ Shielded Waterborne Fluid Hose
24W598	50’ Shielded Waterborne Fluid Hose

FM APPROVED

0.35 J with 50 ft hose max
FM14ATEX0082
EN 50059
Ta 0°C-50°C

CE 0359

FM approved for use with fluids that meet the following condition:

- Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206

Models Compliant with EN 50059 when used with fluids that meet the following criteria:

- Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.

Related Manuals

Manual No.	Description
332989	Instructions - Pro Xp Auto Control Module

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

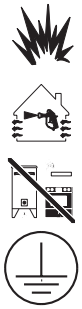
⚠WARNING

ELECTRIC SHOCK HAZARD

Improper grounding, setup, or usage of an isolated waterborne system can result in electric shock. To help prevent electric shock:

- Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. See **Grounding** instructions.
- Connect the electrostatic gun to a voltage isolation system that will discharge the system voltage when not in use.
- All components of the voltage isolation system that are charged to high voltage must be contained within an isolation enclosure that prevents personnel from making contact with the high voltage components before the system voltage is discharged.
- Follow the **Fluid Voltage Discharge and Grounding Procedure** when instructed to discharge the voltage; before cleaning, flushing, or servicing the system; before approaching the front of the gun; and before opening the isolation enclosure for the isolated fluid supply.
- Do not enter a high voltage or hazardous area until all high voltage equipment has been discharged.
- Do not touch the gun nozzle or electrode, or come within 4 in. (102 mm) of the electrode during gun operation. Follow the **Fluid Voltage Discharge and Grounding Procedure**.
- Interlock the gun air supply with the voltage isolation system to shut off the air supply anytime the isolation system enclosure is opened.
- Only use the red-colored Graco electrically conductive air hose with this gun. Do not use black or gray-colored Graco air hoses.
- Do not splice fluid hoses together. Install only one continuous Graco Waterborne Fluid Hose between the isolated fluid supply and the spray gun.

⚠WARNING



FIRE AND EXPLOSION HAZARD

Combustible dust in **work area** can ignite or explode. To help prevent fire and explosion:

- Use only fluids that meet the following flammability requirements:
  - Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.
  - Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.
- Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. Resistance must not exceed 1 megohm. See **Grounding** instructions.
- Do not use pail liners unless they are conductive and grounded.
- Check gun resistance, hose resistance, and electrical grounding daily.
- Use and clean equipment only in well ventilated area.
- Interlock the gun air supply to prevent operation unless ventilating fans are on.
- Only use non-flammable solvents when flushing or cleaning equipment.
- Always turn the electrostatics off when flushing, cleaning or servicing equipment.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.
- Keep spray area free of debris, including solvent, rags and gasoline.
- Keep a working fire extinguisher in the work area.

PRESSURIZED EQUIPMENT HAZARD

Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.

PLASTIC PARTS CLEANING SOLVENT HAZARD

Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.

- Use only compatible water-based solvents to clean plastic structural or pressure-containing parts.
- See **Technical Data** in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's MSDSs and recommendations.

⚠WARNING

TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDSs to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer

EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

Introduction

How the Electrostatic Air Spray Gun Works

The automatic electrostatic air spray gun operates very similar to a traditional air spray gun. The atomization and fan air are emitted from the air cap. The atomization air breaks up the fluid stream and controls the droplet size. The fan air controls the shape and width of the spray pattern. The fan and atomization air can be adjusted independently.

Operating the Spray Function

Applying a minimum of 60 psi (0.42 MPa, 4.2 bar) air pressure to the gun manifold's cylinder air fitting (CYL) will retract the gun piston, which opens the air valves and a short time later opens the fluid needle. This provides the proper air lead and lag when triggering the gun. A spring returns the piston when the cylinder air is shut off.

Operating the Electrostatics

To operate the electrostatics, apply air pressure to the gun manifold's turbine air fitting (TA) through a Graco Grounded Turbine Air Hose. The air enters the manifold and is directed to the inlet of the power supply turbine. The air spins the turbine, which then provides electrical power to the internal high voltage power supply. The fluid is charged by the spray gun electrode. The charged fluid is attracted to the nearest grounded object, wrapping around and evenly coating all surfaces.

Gun Features and Options

- The gun is designed for use with a reciprocator, and can be mounted directly on a 1/2 in. (13 mm) rod. With additional brackets, the gun can be mounted for robotic applications.
- The gun's quick-disconnect design enables its removal without disconnecting the air lines to the gun.
- Gun functions are activated from a separate controller that sends the appropriate signal to the actuating solenoids.

Smart Gun Features

Smart gun models with the Pro Xp Auto Control Module have the ability to:

- Display the spraying voltage and current
- Change the gun voltage setting
- Display the gun turbine speed
- Store spray profiles
- Communicate equipment faults to a PLC
- Display and set maintenance totalizers
- Use a PLC to select a spray profile

To reduce the risk of electric shock, do not use the optional Pro Xp Auto Control Module readings to determine if your system is discharged. The display modules will only display the system voltage while the gun's power supply is operating. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 24 to ensure the system is discharged.

See the Pro Xp Auto Control Module manual 332989 for more information.

Spraying Waterborne Fluids Electrostatically

This electrostatic air spray gun is designed to spray **only** waterborne fluids which meet at least one of the following flammability requirements:

FM, FMc Approved:

- Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.

CE-EN 50059 Compliant:

- Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.

When connected to a voltage isolation system, all of the fluid in the spray gun, fluid hose, and isolated fluid supply is charged to high voltage, which means that the system has more electrical energy than a solvent-based system. Therefore, only non-flammable fluids (as defined above) can be sprayed with the system or used to clean, flush, or purge the system.

Precautions must be taken when using electrostatic waterborne equipment to avoid potential shock hazards. When the electrostatic air spray gun charges the isolated fluid to high voltage, it is similar to charging a capacitor or a battery. The system will store some of the energy while spraying and retain some of that energy after the spray gun is shut off. Do not touch the gun nozzle or come within 4 in. (102 mm) of the electrode until the stored energy is discharged. The amount of time it takes to discharge the energy depends on the system design. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 24 before approaching the front of the spray gun.

NOTE: The Graco warranty and approvals are void if the electrostatic air spray gun is connected to a non-Graco voltage isolation system or if the spray gun is operated above 60 kV.

System Overview

Typical Waterborne System Installation

FIGURE 1 shows a typical electrostatic waterborne air spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

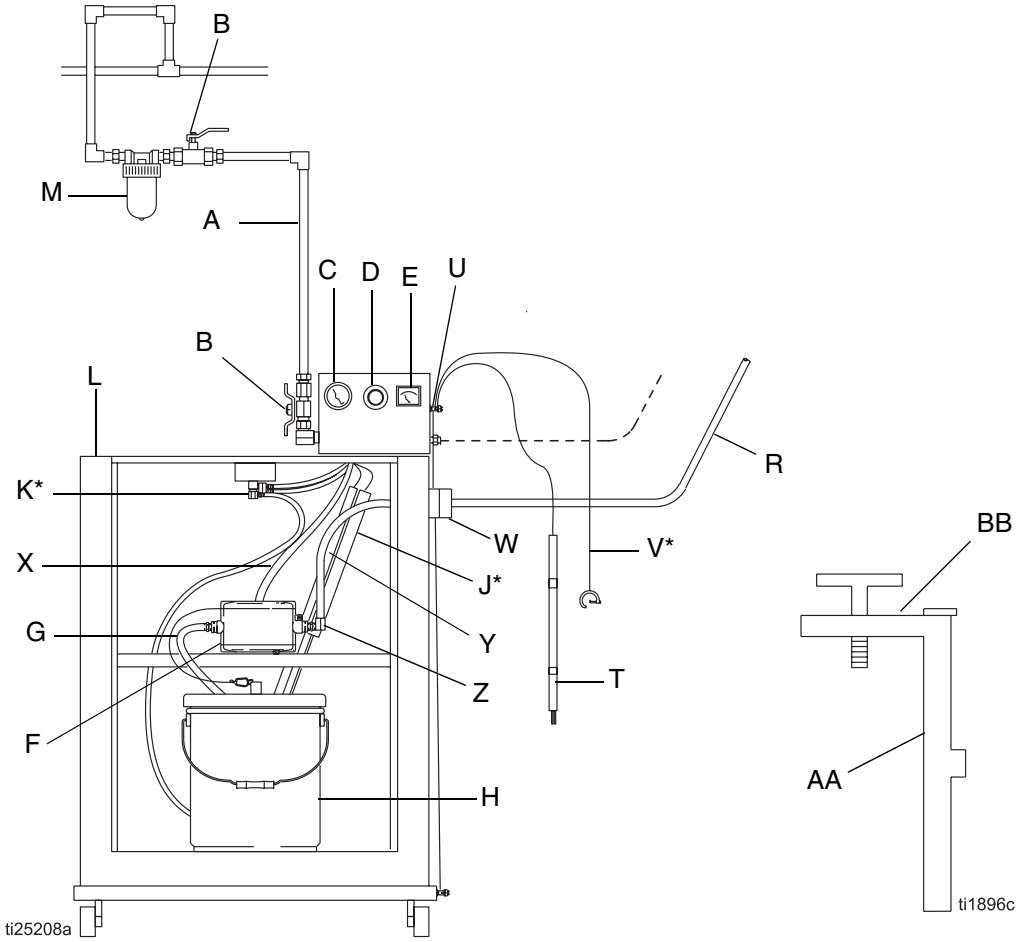


FIG. 1 Typical Installation Pro Xp Auto Waterborne System

Item	Description
A	Main Air Supply Line
B*	Bleed-Type Air Shutoff Valve
C	Pump Air Pressure Gauge
D	Pump Air Pressure Regulator
E	kV Meter
F	Pump
G	Pump Suction Hose
H	Paint Container
J*	Bleed Resistor
K*	Enclosure Safety Interlock
L	Isolated Enclosure
M	Air Line Filter

Item	Description
N	Pneumatic connection to turbine air interlock. (Pressurized when isolation system door is closed)
R	Graco Waterborne Fluid Hose
T	Grounding Rod
U	Ground Terminal
V*	Main Ground Wire
W	Strain Relief/Ground Fitting
X	Pump Air Supply Line
Y	Grounding Cylinder
Z	Pump Fluid Outlet Fitting
AA	Isolated Enclosure Door
BB	Enclosure T-Handle Locking Screw
* These items are required for safe operation and are included with the WB 100.	

Gun Overview

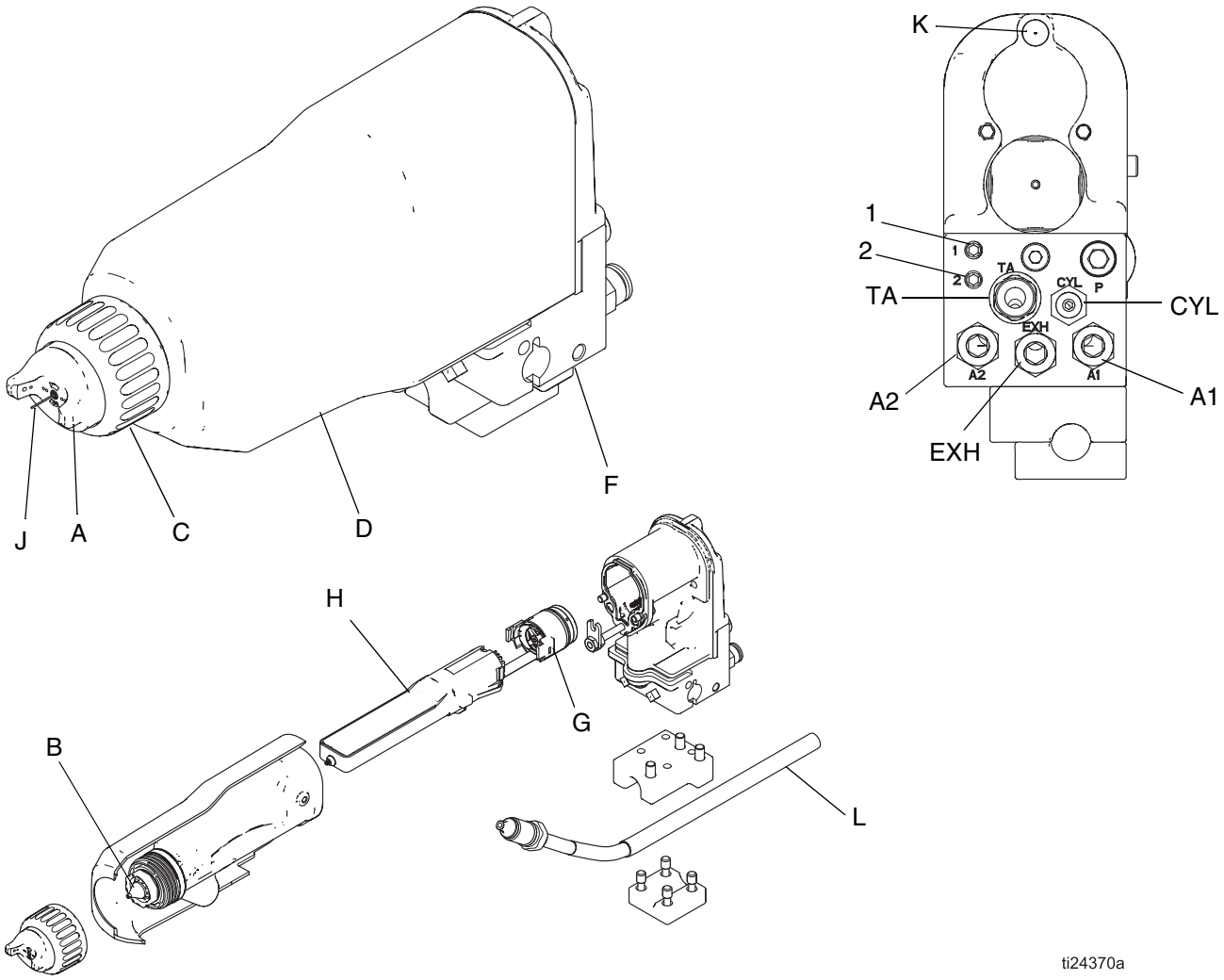


FIG. 2 . Gun Overview

Key

A	Air Cap
B	Fluid Nozzle
C	Retaining Ring
D	Shroud
F	Manifold
G	Alternator
H	Power Supply
J	Electrode
L	Waterborne Fluid Hose

Manifold Fittings and Indicators

A1	Atomization Air Inlet Fitting
A2	Fan Air Inlet Fitting
CYL	Cylinder Air Inlet Fitting
1	Fiber Optic Fitting Transmit (Operational on Smart models only)
2	Fiber Optic Fitting Receive (Operational on Smart models only)
K	ES Indicator Light (standard models only)
TA	Turbine Air Inlet Fitting (to drive turbine)
EXH	Exhaust Outlet Fitting

Installation

System Requirements

Basic Guidelines

When spraying waterborne fluids electrostatically:

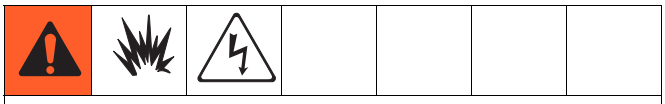
- The gun must be connected to a voltage isolation system, which isolates the fluid supply from ground and allows voltage to be maintained at the tip of the gun.
- The gun must be connected to a voltage isolation system that will discharge the system voltage when the gun is not in use.
- There should be a bleed resistor to drain off the system voltage when the spray gun is not in use.
- All components of the voltage isolation system that are charged to high voltage must be contained within an isolation enclosure that prevents personnel from making contact with the high voltage components before the system voltage is discharged.
- The gun turbine air hose must be interlocked with the voltage isolation system to shut off the turbine air supply anytime the isolation system enclosure is opened or entered.
- The voltage isolation system must be interlocked with the spray area entrance to automatically discharge the voltage and ground the fluid whenever someone opens the enclosure or enters the spray area.
- The system should not have any severe arcing occurring when the isolation mechanism opens and closes. Severe arcing will shorten the life of the system components.

Graco Waterborne Fluid Hose

Use a Graco Waterborne Fluid Hose between the voltage isolation system fluid outlet and the gun fluid inlet. See **Accessories** on page 66 for available hoses. The hose consists of an inner PTFE tube, a conductive layer covering the PTFE tube, and an outer cover.

If a hose failure occurs where high voltage arcs through the inner tube, voltage will be discharged to ground through the conductive hose layer. When properly installed, the conductive hose layer is grounded through its connection to the grounded enclosure.

Install the System



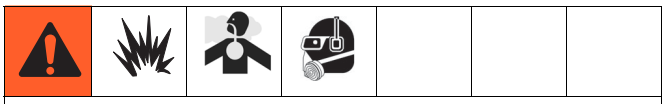
Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.

- Do not install or service this equipment unless you are trained and qualified.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators. An English Warning Sign is provided with the gun.

Ventilate the Spray Booth



Provide fresh air ventilation to reduce the risk of fire or explosion caused by the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Do not operate the gun unless ventilation fans are operating.

Electrically interlock the gun turbine air supply (B) with the ventilators to prevent gun operation without ventilating fans operating.

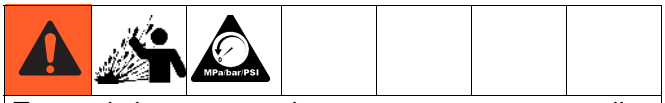
NOTE: High velocity air exhaust will decrease the operating efficiency of the electrostatic system. Check and follow all National, State, and Local codes regarding air exhaust velocity requirements.

Air exhaust velocity of 100 ft/min (31 linear meters/minute) should be sufficient.

Install the Air Line Accessories

See FIGURE 3.

1. Install a bleed-type master air valve (L) on the main air line (W) to shut off all air to the gun.
2. Install an air line filter/water separator on the gun air line to ensure a dry, clean air supply to the gun. Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction.
3. Install a bleed-type air pressure regulator (M) on each of the air supply lines (B, C, D, E) to control air pressure to the gun.
4. Install a solenoid valve (K) on the cylinder air line (E) to actuate the gun. The solenoid valve must have a quick exhaust port.
5. Install a solenoid valve (K) to actuate the turbine.



Trapped air can cause the gun to spray unexpectedly, which can result in serious injury, including splashing fluid in the eyes or on the skin. The solenoid valves (K) must have a quick exhaust port so trapped air will be relieved between the valve and gun when the solenoids are shut off.

Install the Optional Fluid Line Accessories

1. Install a fluid filter and drain valve at the pump outlet.
2. Install a fluid regulator on the fluid line to control fluid pressure to the gun.
3. To reduce the risk of serious injury, including splashing in the eyes or on the skin, do not operate equipment without the fluid drain (FD) valve installed.

FIGURE 3 shows a typical electrostatic air spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

NOTE: The grounded turbine air hose (TA) must be electrically interlocked with the spray booth ventilation fans to prevent the power supply from operating without ventilating fans on.

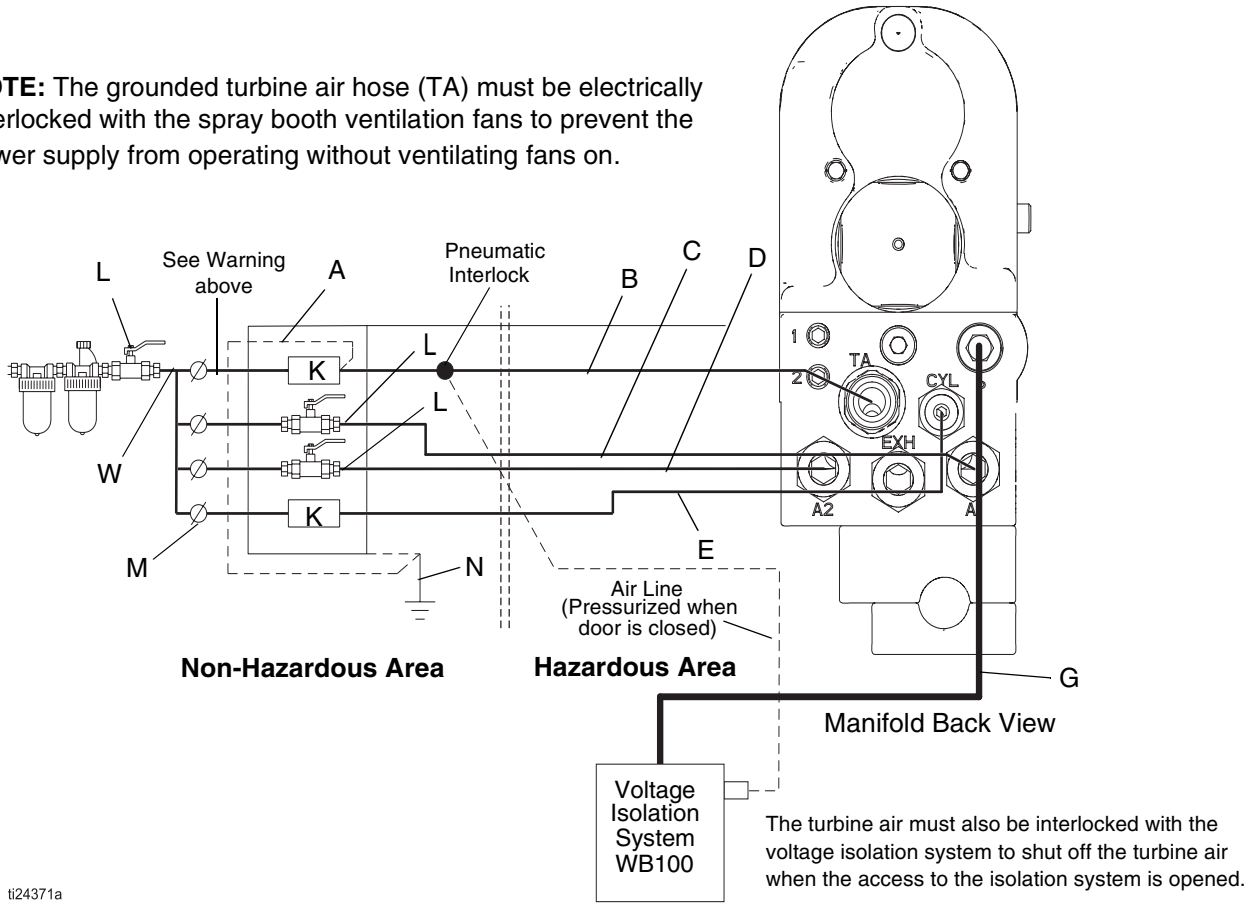


FIG. 3 . Typical Installation

Key to FIGURE 3

A	Air Hose Ground Wire
B	Graco Grounded Turbine Air Hose (TA)
C	Atomizing Air Hose, 5/16 in. (8 mm) OD (A1)
D	Fan Air Hose, 5/16 in. (8 mm) OD (A2)
E	Cylinder Air Hose, 5/32 in. (4 mm) OD (CYL)
G	Graco Waterborne Fluid Supply Hose

K	Solenoid Valve, requires quick exhaust port
L	Bleed-Type Master Air Valve
M	Air Pressure Regulator
N	True Earth Ground
W	Main Air Line

Install the Gun

1. Loosen the manifold's two set screws (29) and slide the manifold (20) onto a 1/2 in. (13 mm) mounting rod. See FIGURE 4.

2. Position the gun and tighten the two set screws.

NOTE: For added positioning reliability, insert a 1/8 in. (3 mm) locating pin into the slot (NN) in the bracket and through a hole in the rod. See the detail in FIGURE 4.

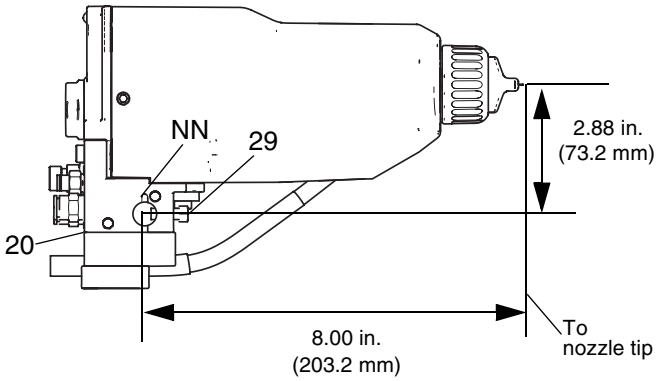


FIG. 4 . Mounting

Install the Pro Xp Auto Control Module

The Pro Xp Auto Control Module is required for use with smart models. To install a Pro Xp Auto Control Module, see the module instruction manual 332989.

Connect the Air Line

FIGURE 3 shows a schematic of air line connections, and FIGURE 5 shows the manifold connections. Connect the air lines as instructed.

To reduce the risk of a fire, explosion, or electric shock, the Graco Grounded Turbine Air Hose must be interlocked with:

- The isolation system to shut off the turbine air supply anytime the enclosure is opened or entered.
- The ventilators to prevent operation of the power supply unless the ventilating fans are on.

To reduce the risk of electric shock or other serious injury, the red-colored Graco Grounded Turbine Air Hose must be used for the turbine air supply hose, and the hose ground wire must be connected to a true earth ground. Do not use the black or gray-colored Graco air hoses.

1. Connect the Graco Grounded Turbine Air Hose (B) to the gun's turbine air inlet (TA) and connect the hose ground wire (A) to a true earth ground (N). The gun turbine air inlet fitting has left-hand threads to prevent connecting another type of air hose to the turbine air inlet. See **Accessories** on page 66 for further information about the hose.

2. Check the electrical grounding of the gun as instructed on page 20.

Ground the Cabinet

Connect the main ground wire (V) to a true earth ground.

Manifold Connections

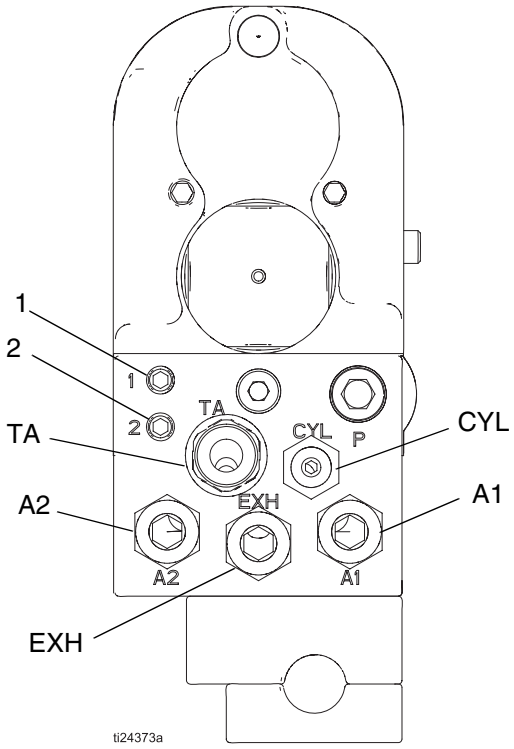


FIG. 5 Manifold Connections

A1	**Atomization Air Inlet Fitting** Connect a 5/16 in. (8 mm) OD tube between this fitting and the air supply.
A2	**Fan Air Inlet Fitting** Connect a 5/16 in. (8 mm) OD tube between this fitting and the air supply.
CYL	**Cylinder Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid. For quicker response, use the shortest hose length possible.
1	**Fiber Optic Fitting Transmit (Operational on Smart models only)** Connect the Graco Fiber Optic cable (see page 20).
2	**Fiber Optic Fitting Receive (Operational on Smart models only)** Connect the Graco Fiber Optic cable (see page 20).
EXH	**Exhaust** Connect a 5/16 in OD exhaust tube to route the turbine exhaust air. (3 ft. max length)
TA	**Turbine Air Inlet Fitting** Connect the Graco Electrically Conductive Air Hose between this fitting (left-hand thread) and the solenoid. Connect the air hose ground wire to a true earth ground.

Connect the Waterborne Fluid Hose

NOTE: The Graco warranty is void if the spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.

Always use a Graco Waterborne Fluid Hose between the voltage isolation system fluid outlet and the gun fluid inlet. The waterborne fluid hose (600) consists of an inner PTFE tube (T), a conductive layer (C), and an abrasion-resistant outer jacket (J). The conductive layer is connected to ground at the isolation enclosure.

Before connecting the waterborne fluid hose to the gun, blow it out with air and flush with water to remove contaminants. Flush the gun before using it. See **Flushing**, page 28.

To reduce the risk of electric shock, install only one continuous Graco Waterborne Fluid Hose between the isolated fluid supply and the spray gun. Do not splice hoses together.

1. Remove the air cap (25) and shroud (26).

NOTICE

Be careful not to cut into the inner tube (T) of the hose when stripping the hose. Nicks or cuts in the PTFE tube will cause premature hose failure.

2. For the waterborne fluid hose to fit properly, it must be stripped and assembled to the dimensions shown in FIGURE 6. Apply dielectric grease to the inner tube (T) of the hose. Slide the fitting (F) onto the tub (T). Press the barbed fitting (G) into the tube until its shoulder bottoms on the tube. A new Graco Waterborne Fluid Hose comes fully assembled to these dimensions.

A	5.75 in. (146 mm)
B	1.5 in. (38 mm)

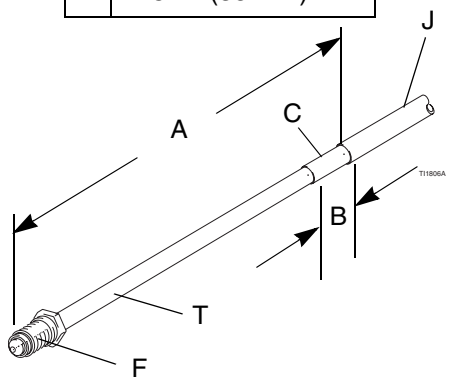


FIG. 6 . Waterborne Hose Dimensions

3. Generously apply dielectric grease (40) to the o-ring (603) and the threads of the fitting (602). Pull the fitting back 1-1/2 in. (38 mm) and apply grease to the exposed PTFE hose to fill the area between the hose and the fitting. Make sure the barrel inlet is clean and dry, then screw the fitting into the fluid inlet of the gun barrel (1).

4. Secure hose in strain relief bracket on the gun by tightening the four plastic screws.

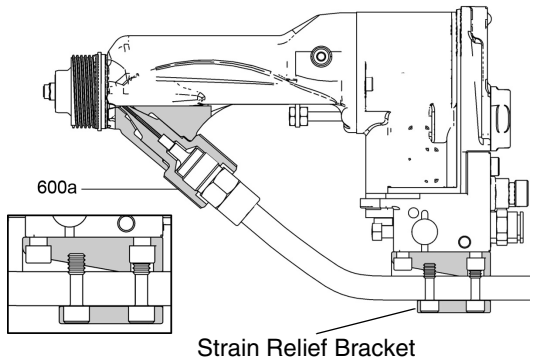


FIG. 7 . Connect the Waterborne Fluid Hose

For Shielded Hose Systems:
Conductive hose layer (C) must be grounded through its connection to the isolation system's grounded enclosure (L) or grounded fence. To maintain grounding continuity, the conductive hose layer (C) must be engaged in the ferrule when the strain relief nut is tightened. Failure to properly install the hose in the strain relief could result in an electric shock.

5. Connect the other end of the hose to the isolated fluid supply as follows:

   a. *Graco WB100 Enclosure:* Slide hose through the strain relief fitting (W). Ensure conductive layer (C) has passed through fitting. Tighten to 55 in-lb (6.2 N•m). Pull back on hose to check it is secure. Comply with the requirements in the following **Warning**.

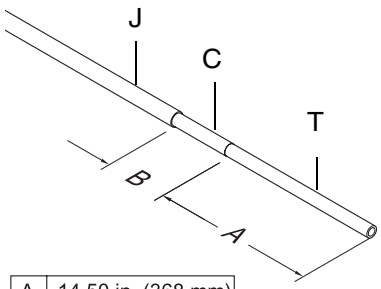


FIG. 8 Shielded Hose Dimensions at WB100 Enclosure

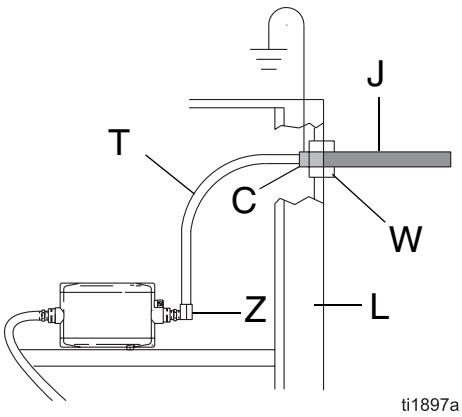


FIG. 9 Shielded Hose Connection at WB100 Enclosure

   b. *Non-Graco Isolated Enclosure:* Connect hose as instructed in the isolation system manual.

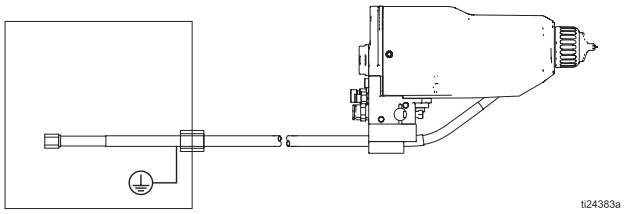


FIG. 10 Shielded Fluid Hose Connection at Non-Graco Isolation Enclosure

   c. Connect the end of the tube (T) to the pump fluid outlet fitting.

6. Reinstall the shroud (26) and air cap (25).

7. Check the gun's electrical grounding (see page 20).

8. Connect the other end of the fluid hose to the fluid outlet of the isolated fluid supply. See FIGURE 10

To reduce the risk of electric shock, the areas of the Graco Waterborne Fluid Hose that are accessible to personnel during normal operation must be covered by the outer hose jacket (J). The portion of the inner hose layer (T) not covered by the outer jacket must be inside the voltage isolation system enclosure (E).

The conductive hose layer (C) must be grounded through its connection to the isolation system's grounded enclosure (E).

Fiber Optic Cable Connection

(Operational on Smart models only)

NOTE: Only use the supplied fiber optic cable.

The fiber optic cable allows the gun to communicate with the Pro Xp Auto Control Module.

For a 1 Gun System

1. Connect Port 1 of the gun 1 manifold to Port 1 of the Control Module.
2. Connect Port 2 of the gun 1 manifold to Port 2 of the Control Module.

For a 2 Gun System

1. Connect Port 1 of the gun 2 manifold to Port 5 of the Control Module.
2. Connect Port 2 of the gun 2 manifold to Port 6 of the Control Module.

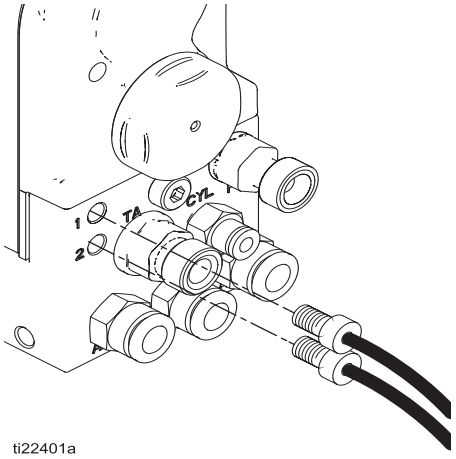
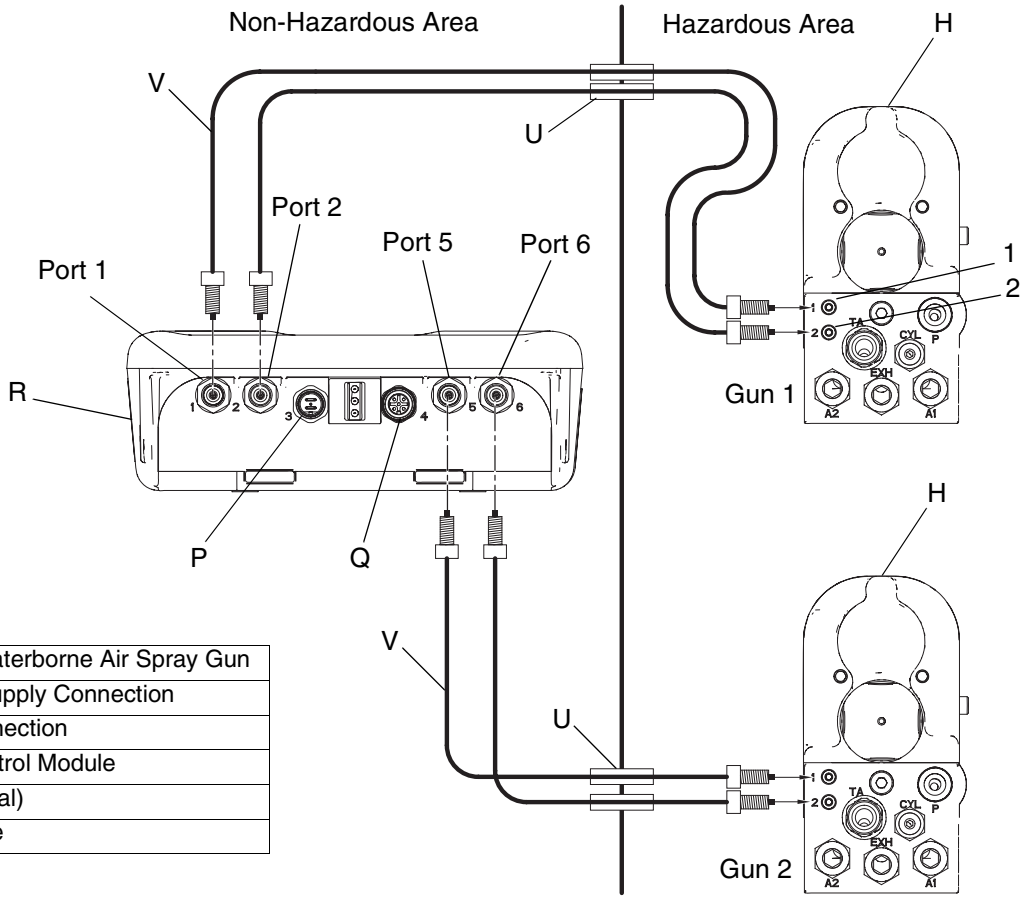


FIG. 11 . Making Fiber Optic Connections



Key for FIGURE 12

H	PRO Xp Auto Waterborne Air Spray Gun
P	24 Volt Power Supply Connection
Q	Remote I/O Connection
R	Pro Xp Auto Control Module
U	Bulkhead (optional)
V	Fiber Optic Cable

FIG. 12 . Fiber Optic Schematic

Agitator Kit Accessory

To add an agitator to the Graco isolation system, order Part No. 245895. See **Agitator Kit 245895**, page 64, for the kit parts list.

1. Discharge the system voltage (see **Fluid Voltage Discharge and Grounding Procedure**, page 24).
2. Relieve the pressure (see **Pressure Relief Procedure**, page 24).
3. Open the isolated enclosure door.
4. Remove the back of the control box (258).
5. Remove tube (A2) from elbow (282) at the air manifold; see **Tubing and Wiring**, page 62. Install the Y fitting (402) into the elbow. Install tubes (A2) and (407) into the Y fitting. Route the agitator tube (407) into the cabinet.
6. Replace the back of the control box (258).
7. Assemble the other parts of the kit as shown. Secure the agitator with the setscrew (408).
8. Return the system to service.

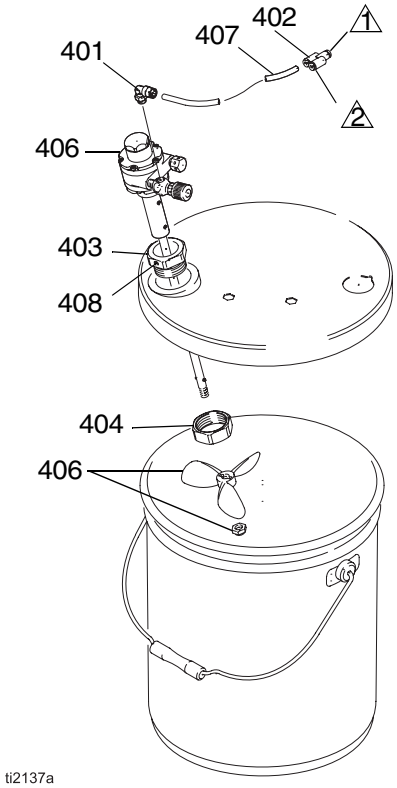


FIG. 13 245895 Agitator Kit

Fluid Regulator Kit Accessory

To add a fluid regulator to the Graco isolation system, order Part No. 245944. See **Fluid Regulator Kit 245944**, page 65 for the kit parts list.

1. Discharge the system voltage (see **Fluid Voltage Discharge and Grounding Procedure**, page 24).
2. Relieve the pressure (see **Pressure Relief Procedure**, page 24).
3. Open the isolated enclosure door.
4. Remove the 1/4 in. (6 mm) OD tube (A1) from the pump air inlet; see **Tubing and Wiring**, page 62.
5. Remove the waterborne fluid hose from the pump fluid outlet fitting (231) and remove the fitting.
6. Unscrew the two pump mounting screws (S) and remove the pump from the isolation enclosure.
7. Remove the back of the control box (258).
8. Remove tube (A2) from elbow (282) at the air manifold; see **Tubing and Wiring**, page 62. Install the Y fitting (506) in the elbow. Install tubes (A2) and (507) into the Y fitting. Route the tube (507) into the cabinet.
9. Replace the back of the control box (258).
10. Assemble the fluid regulator kit as shown.
11. Reinstall the pump in the isolation enclosure. Use the two mounting holes to the left of the holes used previously, to allow clearance for the fluid regulator.
12. Connect tube (A1) to the air inlet of fluid regulator (504). Connect tube (507) to the pump air inlet.
13. Connect the waterborne fluid hose to the fluid regulator outlet fitting (501).
14. Return the system to service.

NOTE: The cabinet air regulator and gauge (216, 217) will now operate the air piloted fluid regulator (504). The pump will now operate at the inlet air pressure.

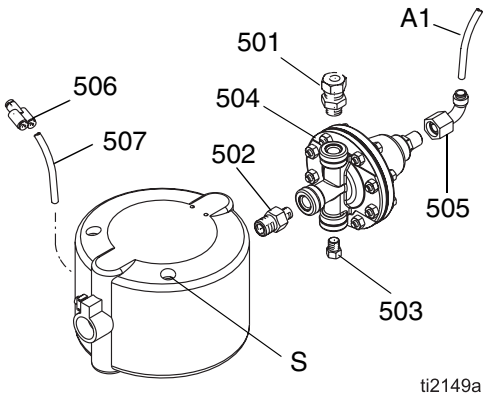
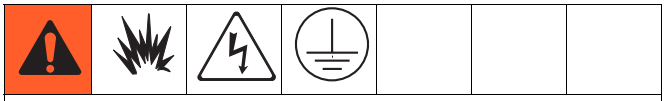


FIG. 14 . 245944 Fluid Regulator Kit

Grounding



When operating the electrostatic gun, any ungrounded objects in the spray area (people, containers, tools, etc.) can become electrically charged. Improper grounding can result in static sparking, which can cause a fire, explosion, or electric shock. Ground all equipment, personnel, object being sprayed, and conductive objects in or close to the spray area. Resistance must not exceed 1 megohm. Follow the grounding instructions below.

The following are minimum grounding requirements for a basic electrostatic waterborne system. Your system may include other equipment or objects which must be grounded. Check your local electrical code for detailed grounding instructions. Your system must be connected to a true earth ground.

- *Electrostatic Air Spray Gun:* ground the gun by connecting the red-colored Graco Grounded Air Hose to the turbine air inlet and connecting the air hose ground wire to a true earth ground. See **Check Electrical Grounding,** page 20
- *Graco Waterborne Fluid Hose:* the hose is grounded through the conductive layer. Install the hose as instructed on page 16.
- *Voltage Isolation System:* electrically connect the voltage isolation system to a true earth ground.
- *Air compressors and hydraulic power supplies:* ground the equipment according to the manufacturer's recommendations.
- *All air and fluid lines* must be properly grounded. *All electrical cables* must be properly grounded.
- *All persons entering the spray area:* shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Do not wear shoes with non-conductive soles such as rubber or plastic.
- *Object being sprayed:* keep the workpiece hangers clean and grounded at all times. Resistance must not exceed 1 megohm.
- *The floor of the spray area:* must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.
- *Flammable liquids in the spray area:* must be kept in approved, grounded containers. Do not use plastic containers. Do not store more than the quantity needed for one shift.
- *All electrically conductive objects or devices in the spray area:* including fluid containers and wash cans, must be properly grounded.
- *Fluid and waste containers:* ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- *All solvent pails:* use only approved, grounded metal containers, which are conductive. Do not use plastic containers. Use only non-flammable solvents. Do not store more than the quantity needed for one shift.

Check Electrical Grounding

Megohmmeter Part No. 241079 is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the Megohmmeter to check electrical grounding unless:

The gun has been removed from the hazardous area
OR
Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

Graco Part No. 241079 Megohmmeter is available as an accessory to check that the gun is properly grounded.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and turbine air hose.

2. Make sure the red-colored turbine air hose (B) is connected and the hose ground wire is connected to a true earth ground.

3. Turn off the air and fluid supply to the gun. Follow the Pressure Relief Procedure, page 24. The fluid hose must not have any fluid in it.

4. Measure the resistance between the turbine air inlet fitting (TA) and a true earth ground (N). If the resistance is greater than 100 ohms, check the tightness of the ground connections and be sure the turbine air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the turbine air hose

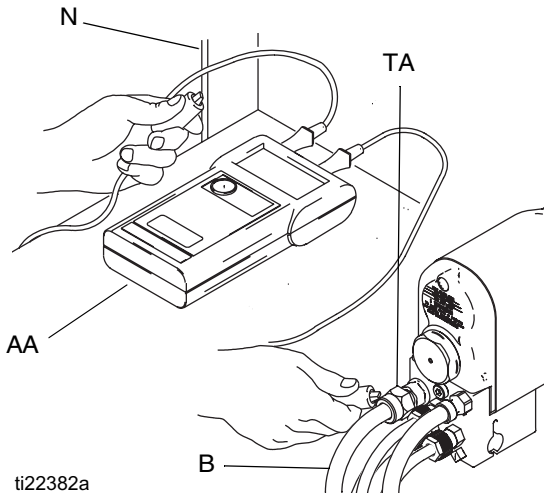


FIG. 15 . Check Gun Grounding

5. If using the WB100 use an ohmmeter (AA) to measure the resistance between the cabinet ground lug (214) and a true earth ground (CC). The resistance must be less than 100 ohms.

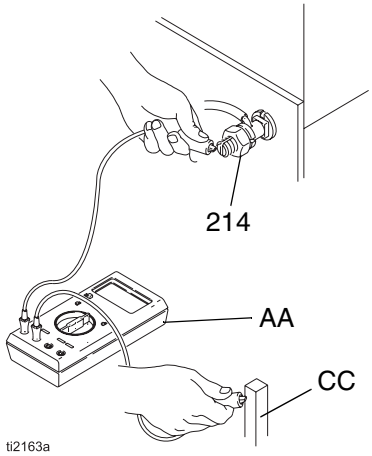


FIG. 16 . Check Cabinet Grounding

Install the Fabric Cover

See FIGURE 17.

1. Install a fabric cover (XX) over the front of the gun and slide it back to cover the exposed tubing and hoses at the back of the manifold.

2. Route the exhaust tube (YY) outside the cover. This enables you to monitor the exhaust tube for the presence of any paint or solvent. See **Check for Fluid Leakage** on page 30. Strap down the exhaust tube to prevent it from moving around.

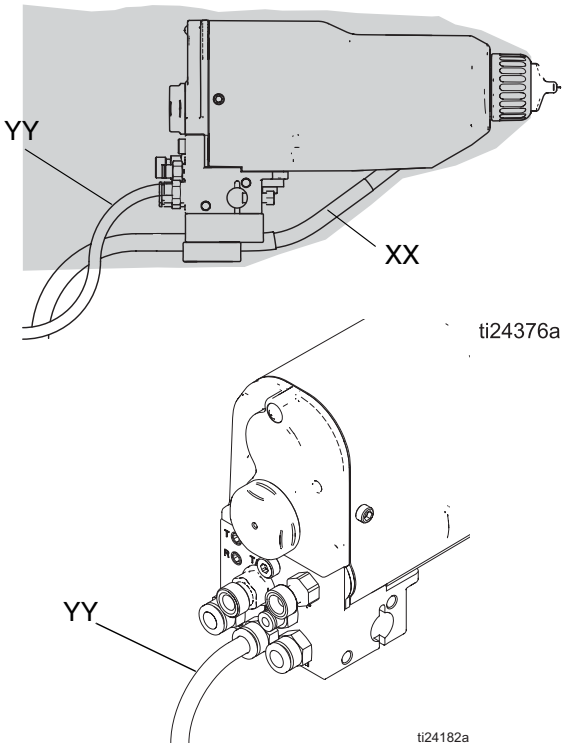


FIG. 17 . Fabric Cover

Check Fluid Viscosity

To check fluid viscosity you will need:

- a viscosity cup
- a stopwatch

1. Completely submerge the viscosity cup in the fluid. Lift the cup out quickly, starting the stopwatch as soon as the cup is completely removed.

2. Watch the stream of fluid coming from the bottom of the cup. As soon as there is a break in the stream, shut off the stopwatch.

3. Record the fluid type, elapsed time, and size of the viscosity cup.

4. If the viscosity is too high or too low, contact the material supplier. Adjust as necessary.

Flush Before Using Equipment

The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment. See **Flushing**, page 28.

Operation

Operating Checklist

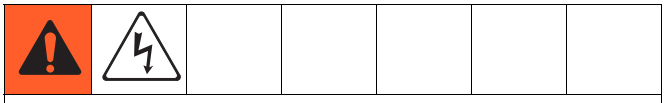
Check the following list daily, before starting to operate the system, to help ensure you of safe, efficient operation.

- ☐ All operators are properly trained to safely operate an automatic electrostatic waterborne air spray system as instructed in this manual.
- ☐ All operators are trained in the **Fluid Voltage Discharge and Grounding Procedure** on page 24.
- ☐ All operators are trained in the **Pressure Relief Procedure** on page 24**.**
- ☐ The electrostatics are turned off and system voltage is discharged according to the **Fluid Voltage Discharge and Grounding Procedure**, page 24, before any person enters the isolation enclosure, before cleaning, and before performing any maintenance or repair.
- ☐ The warning sign provided with the gun is mounted in the spray area where it can be easily seen and read by all operators.
- ☐ The system is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See **Grounding** on page 20.
- ☐ The Graco Waterborne Fluid Hose is in good condition with no cuts or abrasions of the PTFE layer. Replace hose if damaged.
- ☐ The condition of the gun's electrical components has been checked as instructed in **Electrical Tests** on page 31.
- ☐ All fluid hose connections are tight.
- ☐ Ventilation fans are operating properly.
- ☐ Workpiece hangers are clean and grounded.
- ☐ All debris, including flammable fluids and rags, is removed from the spray area.
- ☐ All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.
- ☐ All flammable fluids in the spray booth are in approved, grounded containers.
- ☐ The manifold exhaust tubes have been checked for the presence of any fluid as instructed in **Check for Fluid Leakage** on page 30.
- ☐ Fluids used must meet the following flammability requirements:

  FM, FMc Approved:
  Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.

  CE-EN 50059 Compliant:
  Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ.

Fluid Voltage Discharge and Grounding Procedure



The fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the voltage isolation system or spray gun electrode will cause an electric shock. To avoid an electric shock, follow the **Fluid Voltage Discharge and Grounding Procedure**:

- whenever you are instructed to discharge the voltage
- before cleaning, flushing, or servicing the system equipment
- before approaching the front of the gun
- or before opening the isolation enclosure for the isolated fluid supply.

NOTE: An accessory grounding rod, part No. 210084, is available to discharge any voltage remaining on a system component. Contact your Graco distributor to order.

1. Turn off the turbine air to all spray guns connected to the isolated fluid supply and wait 30 seconds.

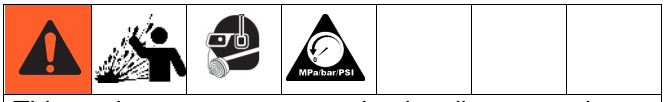
2. Discharge the voltage at the voltage isolation system by following the procedure specified in the voltage isolation system instruction manual.

   For WB100: fully unscrew the door T-handle locking screw. This will shut off the air to the gun and trigger the grounding cylinder to discharge any remaining electrical charge.

3. Touch the pump, supply pail, and electrode of the gun with a grounded rod to make sure the voltage has been discharged. If you see an arc, verify that the electrostatics are turned off or see **Electrical Troubleshooting** on page 39 or the voltage isolation system manual for other possible problems. Resolve the problem before proceeding.

Pressure Relief Procedure

Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

1. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 24.

2. Relieve fluid pressure in the fluid supply and voltage isolation system as instructed in their instruction manuals.

3. Turn off all the air to the spray gun except the cylinder air, which triggers the gun. If an air pilot fluid regulator is used in the system, air pressure is also needed at the regulator air inlet.

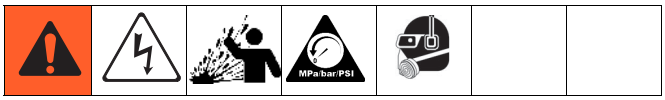
NOTE: The air shut-off device must bleed the air out of the system.

4. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.

5. Turn off all remaining air supplies to the gun.

6. Turn off the main air supply by closing the bleed-type master air valve on the main air supply line. Leave the valve closed until you are ready to spray again.

Fill the Fluid Supply



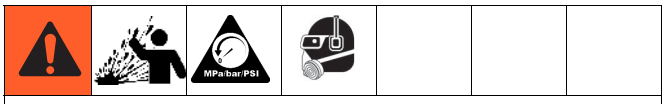
1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24.
2. Follow the **Pressure Relief Procedure**, page 24.
3. Open the isolated enclosure door.
4. Remove the pail cover from the pail, holding a rag over the suction tube strainer to prevent any fluid from dripping into the isolated enclosure. Place the cover and suction tube outside the enclosure.
5. Remove the supply pail from the enclosure.

NOTICE

Be sure to wipe up all fluid spills in the isolated enclosure. Fluid can create a conductive path and cause the system to short out.

6. Clean up any fluid spills in the enclosure, using a soft cloth and a non-flammable, compatible solvent.
7. Fill the supply pail with fluid and return it to the enclosure. Clean up any spills.
8. Reinstall the pail cover, holding a rag over the suction tube strainer to prevent fluid spills while you place the pump suction tube in the pail.
9. Close the isolated enclosure door and fasten securely with the T-handle locking screw. The T-handle must be fully engaged to activate the enclosure safety interlock switch to allow high voltage operation.

Select a Fluid Nozzle and Air Cap



To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 24 before removing or installing a fluid nozzle and/or air cap.

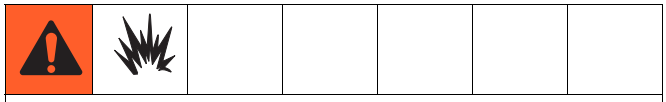
The gun is shipped with the fluid nozzle and air cap installed.

Operating the Spray Function

Applying a minimum of 60 psi (0.41 MPa, 4.1 bar) air pressure to the gun manifold's cylinder air fitting (CYL) will retract the gun piston, which opens the air valves and a short time later opens the fluid needle. This provides the proper air lead and lag when triggering the gun. A spring returns the piston when the cylinder air is shut off.

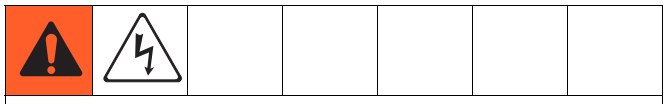
Adjust the Spray Pattern

Follow the steps below to establish the correct fluid flow and air flow. **Do not** turn on the turbine air (TA) yet.

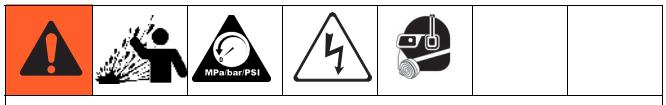


To reduce the risk of fire and explosion, only use this equipment with fluids that meet at least one of the following conditions for non-flammability:

- Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.
- Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500 mJ.



Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation.



To reduce the risk of component rupture, which can cause serious injury, do not exceed the maximum working pressure of the lowest rated system component. This equipment has a 100 psi (0.7 MPa, 7 bar) maximum working air and fluid pressure.

1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24.
2. Follow the **Pressure Relief Procedure**, page 24.

3. Select and install the appropriate air cap for your application.

NOTE: To select a different size fluid nozzle or air cap, see **Parts** on page 50. To install the fluid nozzle and air cap, see **Air Cap/Nozzle Replacement** on page 42.

4. Loosen the air cap retaining ring, and rotate the air cap for a vertical or horizontal spray pattern. See FIGURE 18. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

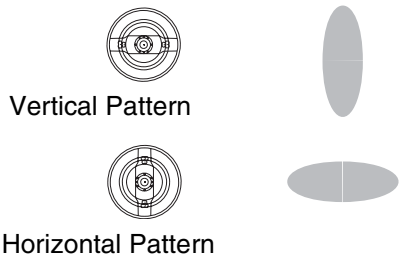


FIG. 18 . Air Cap Positions

5. Adjust the fluid flow with the fluid pressure regulator. Refer to the **Fluid Nozzle Performance Charts** on page 56 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.

6. Use the air pressure regulator on the atomization air supply line (A1) to adjust the degree of atomization. See FIGURE 5. For example, for a fluid flow rate of 10 ounces per minute (0.3 liters per minute), a typical atomization pressure would be 20-30 psi (1.4-2.1 bar, 0.14-0.21 MPa) at the gun manifold.

7. Use the air pressure regulator on the fan air supply line (A2) to adjust the pattern size.

NOTE:

- For the most efficiency, always use the lowest air pressure possible.
- When increasing to a wide, flat pattern, it may be necessary to increase the supply of fluid to the gun to maintain the same amount of coverage over a large area.
- See **Spray Pattern Troubleshooting** on page 37 to correct spray pattern problems.

Adjust the Electrostatics

1. Shut off the fluid supply.

2. Prepare the isolation system for high voltage operation. See **Fill the Fluid Supply**, page 25.

3. Turn on the turbine air (TA) and adjust the air pressure per the settings in Table 1 . Set the proper pressure at the turbine air hose inlet *when air is flowing*.

Table 1. Approximate Dynamic Turbine Air Pressures

Turbine Air Hose Length ft (m)	**Air pressure at turbine air hose inlet for full voltage** psi (bar, MPa)
15 (4.6)	54 (3.8, 0.38)
25 (7.6)	55 (3.85, 0.38)
36 (11)	56 (3.9, 0.39)
50 (15.3)	57 (4.0, 0.40)
75 (22.9)	59 (4.1, 0.41)
100 (30.5)	61 (4.3, 0.43)

4. Check the turbine speed of the gun by checking the indicator light on the standard gun body or for the smart gun check the actual turbine speed on the Pro Xp Auto Control Module. See the following table. Adjust the air pressure as necessary to keep the indicator light green or the values within 400-750 Hz.

NOTE: Smart models display values, standard models display color indicator lights

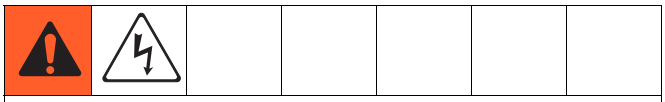
Table 2. Indicator Colors/Values

Indicator Color	Description
Green 400-750 Hz	When spraying, the indicator should remain green, indicating sufficient air pressure to the alternator turbine.
Amber <400	If the indicator changes to amber after 1 second, the air pressure is too low. Increase air pressure until the indicator is green.
Red >750	If the indicator changes to red after 1 second, the air pressure is too high. Decrease air pressure until the indicator is green. Excessive turbine speed can shorten the bearing life and will not increase the voltage output.

5. Check the voltage output by reading the kV meter on the isolated enclosure. 45-55 kV is normal.

See **Electrical Troubleshooting** on page 39 to correct voltage problems.

Spraying

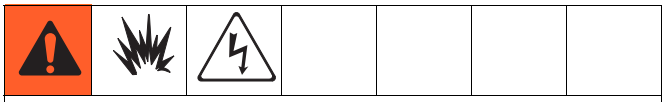


To reduce the risk of electric shock, do not touch the gun electrode or come within 4 in. (10 cm) of the nozzle during gun operation.

1. Apply a minimum of 60 psi (4.2 bar, 0.42 MPa) air pressure to the cylinder air fitting (CYL) to activate the on/off sequence of atomization air (A1), fan air (A2), and fluid (P).

2. Turn the gun functions on and off by using the air solenoid valves on the cylinder (CYL) and turbine (TA) air supply lines.

3. To change to a smart model lower voltage setting, see the Pro Xp Auto Control Module manual.



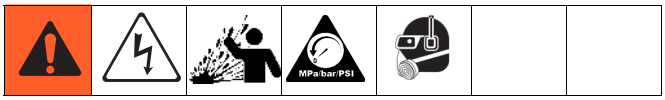
If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage. See **Check for Fluid Leakage** on page 30.

Triggering the Fluid Alone

1. Shut off and relieve the air pressure to the atomization (A1) and fan (A2) air lines, using the bleed-type air shutoff valves.

2. Apply 60 psi (4.2 bar, 0.42 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

Shutdown



1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24.

2. Follow the **Pressure Relief Procedure**, page 24.

3. Flush and clean the equipment. See **Maintenance** on page 28.

Maintenance

To reduce the risk of an injury, follow the **Pressure Relief Procedure** and the **Fluid Voltage Discharge and Grounding Procedure** before doing any maintenance on the gun or system.

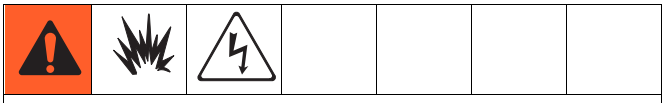
Daily Care and Cleaning Checklist

Check the following list daily upon completion of equipment usage.

- ☐ Flush the gun. See **Flushing**, page 28.
- ☐ Clean the fluid and air line filters.
- ☐ Clean the outside of the gun. See **Clean Outside of Gun**, page 29.
- ☐ Clean the air cap and fluid nozzle daily, minimum. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See **Clean the Air Cap and Fluid Nozzle**, page 29.
- ☐ Check the electrode and replace if broken or damaged. See **Electrode Replacement** on page 43.
- ☐ Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage** on page 30. Tighten fittings or replace equipment as needed.
- ☐ **Check Electrical Grounding**, page 20.

Flushing

- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.



To reduce the risk of fire, explosion, or electric shock, turn off the turbine air (TA) before flushing the gun.

Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24, before flushing.

Only flush, purge, or clean the gun with fluids that meet at least one of the following flammability requirements:

FM, FMc Approved:
Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.

CE-EN 50059 Compliant:
Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ.

NOTICE

Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.

1. Turn off the turbine air and wait 30 seconds for the voltage to bleed off.
2. Discharge the system voltage. See **Fluid Voltage Discharge and Grounding Procedure**, page 24.
3. Follow the **Pressure Relief Procedure**, page 24.
4. Remove and clean the air cap.
5. Change the fluid source to non-flammable solvent.
6. Trigger the gun to flush the fluid passages clean.

Clean Outside of Gun

NOTICE

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the turbine life. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24
2. Flush the gun. See **Flushing**, page 28
3. Follow the **Pressure Relief Procedure**, page 24.
4. Clean the outside of the gun with a compatible solvent. Use a soft cloth. Wring out excess fluid from cloth. Point the gun down to prevent solvent from entering the gun passages. Do not immerse the gun.

Clean the Air Cap and Fluid Nozzle

Equipment Needed

- soft bristle brush
- compatible solvent

Procedure

1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24
2. Flush the gun. See **Flushing**, page 28
3. Remove the air cap assembly (24, 25) and shroud (26). See FIGURE 19.
4. Wipe the fluid nozzle (4), shroud (26), and exterior of the gun clean with a cloth dampened in solvent. Avoid getting any solvent into the air passages. Whenever possible, point the gun down when cleaning it.
5. If it appears that there is paint inside the fluid nozzle (4) air passages, remove the gun from the line for servicing. See **Air Cap/Nozzle Replacement**, page 42 to remove the fluid nozzle for cleaning or replacement.
6. Clean the air cap (25) with the soft bristle brush and solvent or submerge the air cap in suitable solvent and wipe it clean. Do not use metal tools.
7. Slide the shroud (26) onto the gun.
8. Carefully install the air cap (25). Be sure to insert the electrode (3) through the center hole of the air cap. Rotate the air cap to the desired position.
9. Make sure the u-cup (24a) is in place on the retaining ring (1). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.
10. Test gun resistance, page 31.

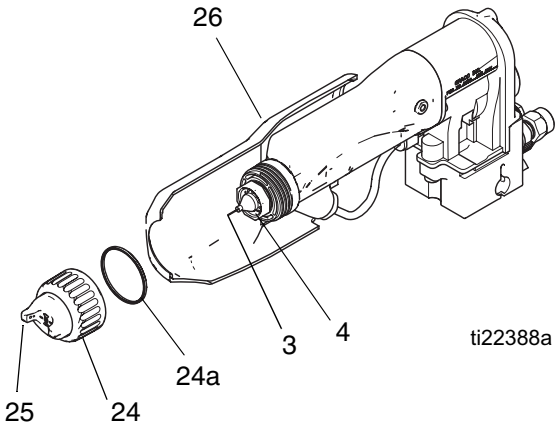
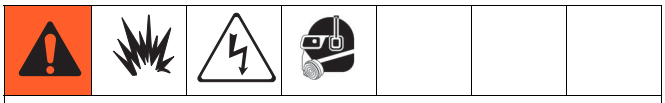
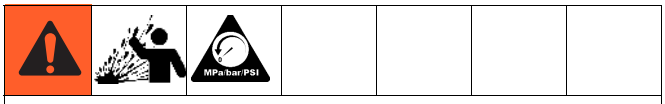


FIG. 19 . Clean Air Cap and Fluid Nozzle

Check for Fluid Leakage



If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage.



To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 24 when you stop spraying and whenever you are instructed to relieve the pressure.

During operation, periodically check all openings of the gun shroud (ZZ) for the presence of fluid. See FIGURE 20. Fluid in these areas indicates leakage into the shroud, which could be caused by leaks at the fluid tube connections or fluid packing leakage.

If fluid is seen in these areas, stop spraying immediately. Discharge the system voltage, relieve the pressure, then remove the gun for repair.

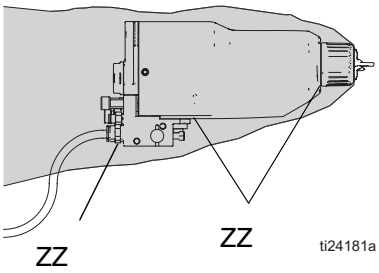


FIG. 20 Check for Fluid Leakage

Clean the Cabinet

- Inspect the cabinet and clean up any spilled paint. Conductive paint residue allowed to contact grounded parts may short out the electrostatics.
- Keep the inside of the cabinet clean, for proper operation.
- Inspect the door T-handle locking screw regularly, to ensure the threads are well greased. Apply silicone-free grease to the threads when necessary.
- Visually inspect the ground strip (240) for damage. Replace if needed. Measure the resistance weekly. See **Test Ground Strip Resistance**, page 33.

Electrical Tests

Use the following procedures to test the condition of the power supply and gun body, and electrical continuity between components. See **Power Supply Removal and Replacement**, page 47.

Use megohmmeter Part No. 241079 (AA) and an applied voltage of 500 V. Connect the leads as shown.

Megohmmeter Part No. 241079 (AA-see FIGURE 21) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the Megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous area;
- Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

Test Gun Resistance

1. Flush and dry the fluid passage.
2. Trigger the gun and measure resistance between the electrode needle tip (3) and the turbine air fitting. The resistance should be 90-120 megohms. If outside this range, go to **Test Power Supply Resistance**, page 32. If in range, and there are other performance concerns, see **Voltage Loss Troubleshooting**, page 34 for other possible causes of poor performance.

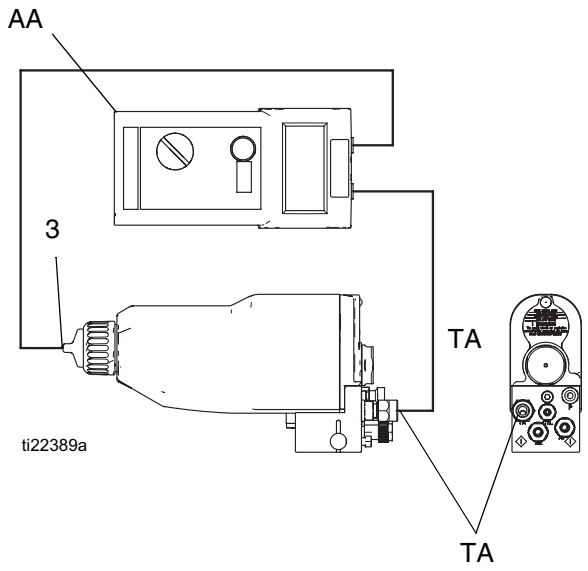


FIG. 21 . Test Gun Resistance

Test Power Supply Resistance

1. Remove the power supply (7), page 47.
2. Remove the turbine alternator (8) from the power supply, page 48.
3. Measure resistance from the power supply's ground strips (EE) to the spring (7a). See FIGURE 22.
4. The resistance should be 90-115 megohms. If outside this range, replace the power supply. If in range, proceed to the next test.
5. Refer to **Electrical Troubleshooting** on page 39 for other possible causes of poor performance.
6. Be sure the spring (7a) is in place before reinstalling the power supply.

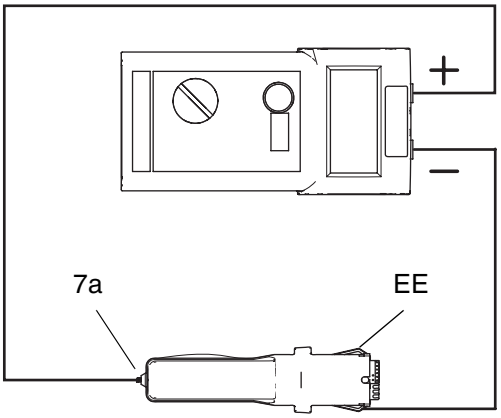


FIG. 22 . Test Power Supply Resistance

Test Electrode Resistance

Remove the electrode (3). See **Electrode Replacement**, page 43. Measure the resistance between the contact (HH) and the electrode wire (GG). The resistance should be 8-30 megohms. If out of range, replace the electrode.

NOTE: If the gun resistance is still out of range after testing the power supply and electrode:

- Check that the conductive o-ring (4a) is making contact with the barrel pin.
- Check that the power supply spring (7a) is making contact with the barrel pin.

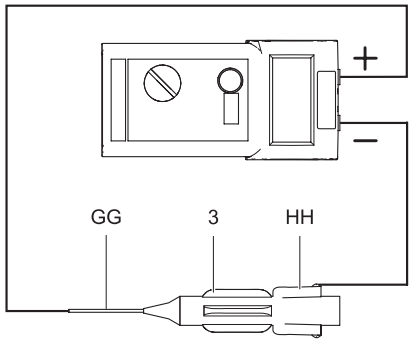


FIG. 23 . Test Electrode Resistance

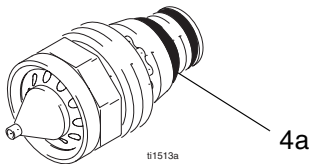


FIG. 24 Nozzle Conductive O-Ring

Test Ground Strip Resistance

Using an ohmmeter, measure the resistance between the latch housing (206) and the ground lug (214). The ground strip is grounded through the cart back to the ground lug. Resistance must be less than 100 ohms. If greater than 100 ohms, replace the ground strip (240).

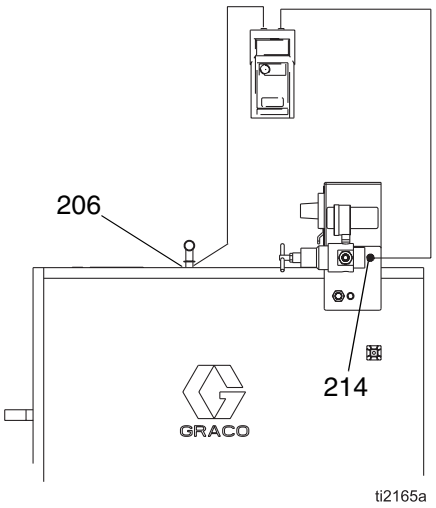


FIG. 25 . Test Electrode Resistance

Test Cylinder Resistance

Remove the enclosure door. Using an ohmmeter, measure the resistance from the pump (209) to the ground lug (214). Resistance must be less than 100 ohms. If greater than 100 ohms, replace the grounding cylinder (227).

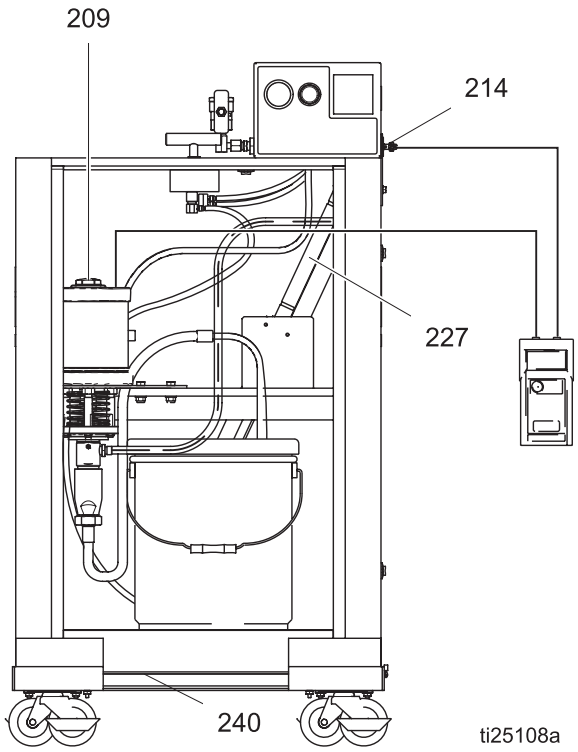
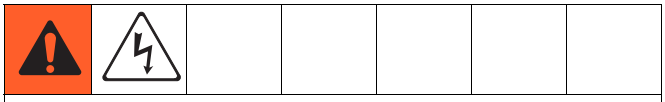


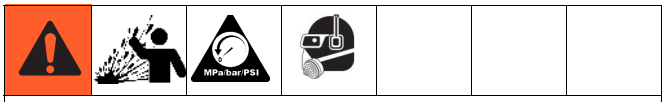
FIG. 26 Test Cylinder Resistance

Troubleshooting



Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.

Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 24 before checking or servicing the system and whenever you are instructed to discharge the voltage.



To reduce the risk of an injury, follow the **Pressure Relief Procedure** whenever you are instructed to relieve the pressure.

NOTE: Check all possible remedies in the Troubleshooting Chart before disassembling the gun.

Voltage Loss Troubleshooting

Normal spraying voltage for a system using the waterborne gun is 45-55 kV. The system voltage is lower due to spraying current demands and voltage isolation system losses.

A loss of spraying voltage can be caused by a problem with the spray gun, fluid hose, or voltage isolation system, since all of the system components are electrically connected through the conductive, waterborne fluid.

Before troubleshooting or servicing the voltage isolation system itself, you need to determine which component in the system is most likely causing a problem. Possible causes include the following:

Spray Gun

- Fluid leakage
- Dielectric breakdown at the fluid hose connection or fluid packings
- Not enough air pressure for the alternator turbine
- Faulty power supply
- Excessive over spray on gun surfaces
- Fluid in the air passages

Waterborne Fluid Hose

- Dielectric failure of the hose (pin-hole leak in the PTFE layer)
- Air gap in the fluid column between the gun and the isolated fluid supply, causing a low voltage reading on the isolation system voltage meter.

Voltage Isolation System

- Fluid leakage
- Dirty interior
- Dielectric breakdown of hoses, seals, or connections
- Isolators not functioning properly

Visual Checks

First, check the system for any visible faults or errors to help isolate whether the spray gun, fluid hose or voltage isolation system has failed. A voltage probe and meter, part no. 245277, is helpful for diagnosing voltage problems and is required for some of the troubleshooting tests that follow.

1. Check that all of the air and fluid tubes and hoses are properly connected.
2. Check that the voltage isolation system valves and controls are properly set for operation.
3. Check that the interior of the isolated enclosure is clean.
4. Check that the spray gun and voltage isolation system have sufficient air pressure.
5. Check that the spray gun and voltage isolation system have sufficient air pressure.
6. Check that the gun turbine air (TA) is turned on and the pressure is set correctly.
7. Check that the voltage isolation system's enclosure door is closed and that any safety interlocks are engaged and working properly.
8. Make sure the voltage isolation system is in the “isolate” mode, where it is isolating the fluid voltage from ground.
9. To eliminate air gaps in the fluid column, spray enough fluid to purge the air out between the voltage isolation system and the spray gun. An air gap in the fluid hose can break the electrical continuity between the spray gun and the isolated fluid supply and cause a low voltage reading on a voltage meter connected to the isolated fluid supply.
10. Check the spray gun cover and barrel for accumulated over spray. Excessive over spray can create a conductive path back to the grounded gun body. Install a new gun cover and clean the exterior of the gun.
11. Inspect the entire system for any visible fluid leakage and repair any fluid leaks that are found. Pay special attention to the following areas:
    - Packing area of the spray gun.
    - Fluid hose: check for leakage or any bulges in the outer cover, which may indicate an internal leak.
    - Internal voltage isolation system components

Tests

If you still have no voltage, separate the spray gun and hose from the voltage isolation system and check whether the gun and hose alone will hold voltage with the following test.

1. Flush the system with water and leave the lines filled with water.
2. Discharge the system voltage (see **Fluid Voltage Discharge and Grounding Procedure** on page 24.
3. Follow the **Pressure Relief Procedure** on page 24.
4. Disconnect the fluid hose from the voltage isolation system.

   Avoid allowing any water to leak out of the fluid hose as that could cause a significant air gap in the fluid column up to the gun electrode, which can break the conductivity path and conceal a potential failure area.
5. Position the end of the hose as far as possible away from any grounded surface. The end of the hose must be at least 1 ft. (0.3 m) from any ground. Make sure that no one is within 3 ft. (0.9 m) of the end of the hose.
6. Turn the turbine air to the gun on. Measure the voltage at the gun electrode with a voltage probe and meter.
7. Discharge the system voltage by waiting 30 seconds and then touching the gun electrode with a grounded rod.
8. Check the meter reading:
   - If the meter reading is 45 to 55 kV, the gun and fluid hose are okay, and the problem is in the voltage isolation system.
   - If the meter reading is below 45 kV, the problem is in the gun or fluid hose.
9. Flush the fluid hose and gun with enough air to dry out the fluid passages.
10. Turn the turbine air to the gun on. Measure the voltage at the gun electrode with a voltage probe and meter.
11. If the meter reading is 55-60 kV, the gun power supply is okay, and there is probably a dielectric breakdown somewhere in the fluid hose or gun. Continue with step 12.

If the reading is below 55 kV, do the electrical tests on page 31 to check the gun and power supply resistance. If those tests show the gun and power supply are okay, continue with step 12.

12. A dielectric breakdown is most likely in one of the following three areas. Repair or replace the component that is failing.
    a. Fluid hose:
       - Check for leakage or any bulges in the outer cover, which may indicate a pin-hole leak through the PTFE layer. Disconnect the fluid hose from the gun, and look for signs of fluid contamination on the outside of the PTFE portion of the fluid tube.
       - Inspect the end of the hose connected to the voltage isolation system. Look for cuts or nicks.
       - Make sure the hose is properly stripped (see **Connect the Waterborne Fluid Hose**, page 16). Restrip or replace the hose.

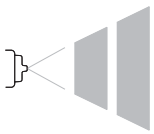
    b. Fluid packings:
       - Remove the packing assembly from the gun (see Fluid Packing Rod Removal, page 56), and look for signs of fluid leakage or any blackened areas, which would indicate arcing is occurring along the packing rod.

    c. Fluid hose connection to the spray gun:
       - A breakdown at the fluid hose connection joint would be caused by fluid leaking past the o-ring seals on the end of the hose. Remove the hose at the gun connection and look for signs of fluid leakage along the PTFE tube.
13. Before reassembling the gun, clean and dry the gun fluid inlet tube. Repack the inner spacer of the fluid packing rod with dielectric grease and reassemble the gun.
14. Reconnect the fluid hose.
15. Check the gun voltage with the voltage probe and meter before filling the gun with fluid.

Spray Pattern Troubleshooting

NOTE: Check all possible remedies in the Troubleshooting Chart before disassembling the gun.

NOTE: Some spray pattern problems are caused by the improper balance between air and fluid.

Problem	Cause	Solution
Fluttering or spitting spray. 	No fluid.	Refill supply.
	Loose, dirty, damaged nozzle/seat.	Clean or replace nozzle, page 42.
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern.	Damaged nozzle or air cap.	Replace, page 42.
	Fluid buildup on air cap or nozzle.	Clean. See page 29.
	Fan air pressure too high.	Decrease.
	Fluid too thin.	Increase viscosity.
	Fluid pressure too low.	Increase.
	Fan air pressure too low.	Increase.
	Fluid too thick.	Reduce viscosity.
	Too much fluid.	Decrease flow.
Streaks.	Did not apply 50% overlap.	Overlap strokes 50%.
	Dirty or damaged air cap.	Clean, page 29 or replace, page 42.

Gun Operation Troubleshooting

Problem	Cause	Solution
Excessive spray fog.	Atomizing air pressure too high.	Decrease air pressure as low as possible.
	Fluid too thin.	Increase viscosity.
“Orange Peel” finish.	Atomizing air pressure too low.	Increase air pressure; use lowest air pressure necessary.
	Poorly mixed or filtered fluid.	Remix or refilter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area	Worn packings or rod.	Replace; see page 43.
Air leaks from the air cap	Worn piston stem o-rings.	Replace, see page 45.
Fluid leakage from the front of the gun	Worn or damaged packing rod.	Replace, see page 44.
	Worn fluid seat.	Replace fluid nozzle (4) and/or electrode needle (3). See page 42.
	Loose fluid nozzle.	Tighten, See page 42
	Damaged nozzle o-ring.	Replace; see page 42.
Gun does not spray	Low fluid supply.	Add fluid if necessary.
	Damaged air cap.	Replace; see page 42.
	Dirty or clogged fluid nozzle.	Clean; see page 42.
	Damaged fluid nozzle.	Replace, see page 42
	Piston not actuating.	Check cylinder air. Check piston o-ring (11d); see page 45
	Actuator arm is out of position.	Check actuator arm and nuts. See page 46.
Dirty air cap	Misaligned air cap and fluid nozzle.	Clean fluid buildup off air cap and fluid nozzle seat; see page 29.
	Damaged nozzle orifice.	Replace nozzle (4); see page 42
	Fluid is coming on before the air.	Check actuator arm and nuts. See page 46.
Air leaks from manifold	Manifold is not tight	Tighten manifold screws
	Worn or missing o-rings	Replace o-rings. See page 46
Fluid leaks at the quick-disconnect.	Manifold is not tight.	Tighten manifold screws.
	Fluid hose o-rings are worn or missing.	Inspect or replace o-rings
	Hose not seated properly.	Make sure the hose was stripped and installed correctly. See **Connect the Waterborne Fluid Hose**, page 16.

Electrical Troubleshooting

Problem	Cause	Solution
Voltage still present at gun after following the **Fluid Voltage Discharge and Grounding Procedure,** page 24.	Turbine air is not turned off.	Turn off.
	Did not wait long enough for voltage to discharge.	Wait longer before touching electrode with grounded rod. Check for bleed resistor failure.
	Air pocket in fluid line leaves fluid near gun isolated.	Determine cause and correct. Purge air from fluid line.
	Voltage isolation system failed.	Service voltage isolation system.
Poor wrap.	Turbine air is not turned on.	Turn on.
	Booth exhaust velocity is too high.	Reduce velocity to within code limits.
	Atomizing air pressure too high.	Decrease.
	Fluid pressure too high.	Decrease.
	Incorrect distance from gun to part.	Should be 8-12 in. (200-300 mm).
	Poorly grounded parts.	Resistance must be 1 megohm or less. Clean workpiece hangers.
	Faulty gun resistance.	See **Test Gun Resistance** on page 31.
	Fluid leaks from the packing (2d) and causes a short.	Clean the packing rod cavity, or replace the packing rod. See page page 44
	Faulty turbine alternator.	See **Turbine Removal and Replacement** page 48
	No power.	Check power supply, alternator, and alternator ribbon cable. See **Power Supply Removal and Replacement**, page 47.
	Spilled paint, dried paint, or other contaminants inside the WB100 Enclosure, causing a short circuit.	Check power supply, alternator, and alternator ribbon cable. See **Power Supply Removal and Replacement**, page 47.
	Grounding cylinder not retracted	Check operation of grounding cylinder.

ES indicator light is not lit (standard models only)	No power	Check power supply, turbine, turbine ribbon cable. See **Power Supply Removal and Replacement**, page 47 and **Turbine Removal and Replacement**, page 48.
ES indicator light is amber (standard models only)	Turbine speed is too low	Increase air pressure until indicator is green.
ES indicator light is red (standard models only)	Turbine speed is too high	Decrease air pressure until indicator is green
No voltage or low voltage reading on the smart gun Pro Xp Auto Control Module	Damaged fiber optic cable or connection.	Check; replace damaged parts. See the Pro Xp Auto Control Module manual 332989.
	Turbine air is not turned on.	Turn on.
	Poor wrap.	See causes and solutions under Poor Wrap, above.
Pro Xp Auto Control Module displays event code (smart models only)		See manual 332989 for Event Code Troubleshooting.

Repair

Prepare the Gun for Service

Installing and repairing this equipment requires access to parts that may cause electric shock or other serious injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 4 in. (102 mm) of the front of the gun during operation or until performing the **Fluid Voltage Discharge and Grounding Procedure**.

To reduce the risk of injury, follow the **Pressure Relief Procedure** before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

NOTE:

- Check all possible remedies in **Troubleshooting** before disassembling the gun.
- Use a vise with padded jaws to prevent damage to plastic parts.
- Lubricate some packing rod parts (2) and certain fluid fittings with dielectric grease (44), as specified in the text.
- Lightly lubricate o-rings and seals with non-silicone grease. Order Part No. 111265 Lubricant. Do not over-lubricate.
- Only use genuine Graco parts. Do not mix or use parts from other PRO Gun models.
- Air Seal Repair Kit 24W390 is available. The kit must be purchased separately. Kit parts are marked with an asterisk, for example (6a*).
- Fluid Seal Repair Kit 24W391 is available. The kit must be purchased separately. Kit parts are marked with a symbol, for example (2a‡).

Remove the Gun from the Manifold

1. Follow the **Fluid Voltage Discharge and Grounding Procedure**, page 24.
2. Flush and clean the gun, page 28.
3. Follow the **Pressure Relief Procedure**, page 24.
4. Remove the air cap (25) and shroud (26), page 42.
5. Loosen the fluid hose strain relief bracket.
6. Disconnect the fluid hose fitting (602) from the gun barrel (1).
7. Loosen two manifold screws (21) and remove gun.

NOTE: The screws (21) should stay on the manifold and the five o-rings (18) should stay on the gun.

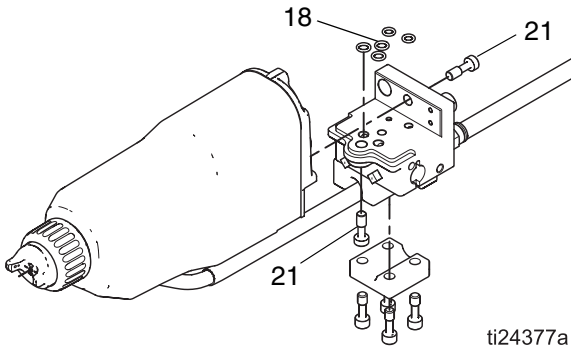


FIG. 27 Remove Gun from Manifold

Install the Gun on the Manifold

1. Make sure the five o-rings (18) are in place.
2. Secure the gun to the manifold by tightening the two manifold screws (21).
3. Make sure the hose fittings and barrel are clean and dry, then reconnect the waterborne fluid hose, page 16.
4. Tighten strain relief screws.
5. Reinstall the gun cover (26) and air cap (25).

Air Cap/Nozzle Replacement

1. Prepare gun for service, page 41.

2. Remove the retaining ring (24) and air cap (25). See FIGURE 28.

3. Remove the fluid nozzle (4) assembly with the multi-tool (44).

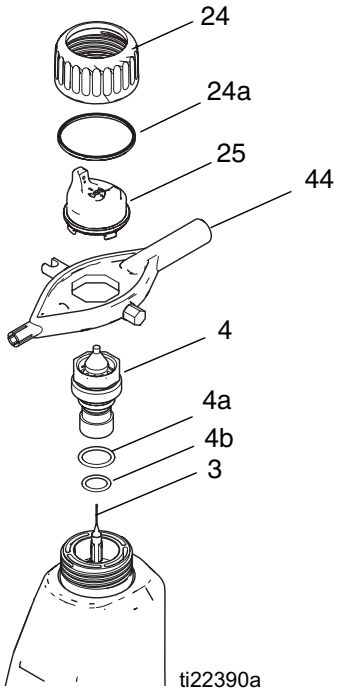


FIG. 28 . Air Cap/Nozzle Replacement

The nozzle contact ring (4a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of sparking or electric shock, do not remove the nozzle contact ring (4a) except to replace it and never operate the gun without the contact ring in place. Do not replace the contact ring with anything but a genuine Graco part.

NOTE: Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the contact ring (4a).

4. Make sure the conductive contact ring (4a) and the small o-ring (4b) are in place on the nozzle (4). Lightly lubricate the small o-ring (4b).

NOTE: Make sure the electrode needle (3) is finger-tight (page 43).

5. Install the fluid nozzle (4) with the multi-tool (44). Tighten until the fluid nozzle seats in the gun barrel (1/8 to 1/4 turn past hand-tight).

6. Assemble the shroud.

7. Carefully install the air cap (25). Be sure to insert the electrode (3) through the center hole of the air cap. Rotate the air cap to the desired position.

8. Make sure the u-cup (24a) is in place on the retaining ring (24). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

9. Test gun resistance, page 31.

10. Install the gun onto the manifold and bracket.

Electrode Replacement

1. Prepare the gun for service, page 41.
2. Remove the air cap and nozzle, page 42.
3. Unscrew the electrode (3) with the multi-tool (44). FIGURE 29.

NOTICE

To avoid damaging the plastic threads, be very careful when installing the electrode.

4. Apply low-strength (purple) or equivalent thread sealant to the electrode and packing rod threads. Install the electrode finger-tight. Do not over tighten.
5. Install the fluid nozzle, page 42.
6. Test gun resistance, page 31.
7. Install the air cap, page 42.
8. Install the gun onto the manifold and bracket.

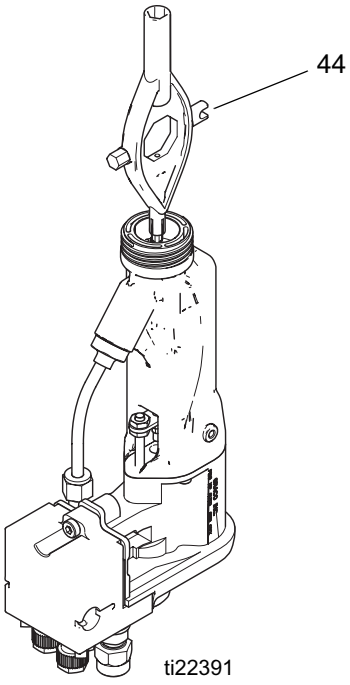


FIG. 29 . Electrode Replacement

Fluid Packing Removal

NOTE: You may replace the packing rod as an assembly, as described below, or as individual parts (see page 44). The assembly is pre-adjusted at the factory.

1. Prepare the gun for service, page 41.
2. Remove the air cap, page 42. Remove the gun shroud (26).
3. Remove the jam nut (16) and actuator arm (15) and adjustment nut (16). See FIGURE 33.

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

4. Remove the fluid nozzle (4) and electrode (3). See page 43.
5. Remove the packing rod (2), using the multi-tool (44).

NOTICE

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

6. Check all parts for wear or damage and replace if necessary.

NOTE: Before installing the packing rod, clean the internal surface of the barrel (1) with a soft cloth or brush. Check for marks from high voltage arcing. If marks are present, replace the barrel.

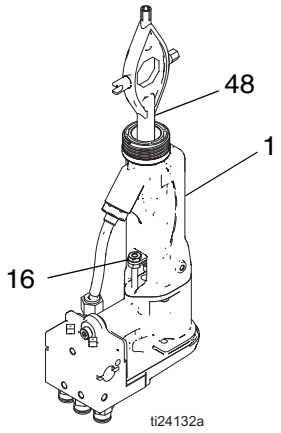


FIG. 30 . Fluid Packing Removal

Packing Rod Repair

NOTE: You may replace the packing rod as individual parts, as described below, or as an assembly (see page 43). The assembly is pre-adjusted at the factory.

NOTE: Before installing the fluid packing rod into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth. Check the inside of the barrel for marks from high voltage arcing. If marks are present, replace the barrel.

1. Place the packing nut (2f) and seal (2b‡) on the fluid rod (2e). Flats on the packing nut must face the back of the fluid rod. The seal o-ring must face away from the packing nut.
2. Fill the inner cavity of the spacer (2h‡) with dielectric grease (43). Place the spacer on the fluid rod (2e) in the direction shown. Generously apply dielectric grease to the outside of the spacer.
3. Place the fluid packing (2c‡) on the packing rod (2e) with its lips facing the front of the rod. Install the needle packing (2d‡) with the male end toward the fluid packing, then install the housing (2g).
4. Lightly tighten the packing nut (2f). The packing nut is properly tightened when there is 3 lb (13.3N) of drag force when sliding the packing housing (2g) assembly along the rod. Tighten or loosen the packing nut as needed.
5. Install the o-ring (2a‡) on the outside of housing (2g). Lubricate the o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.
6. Install the spring (5) against the nut (2j) as shown.
7. Install the packing rod assembly (2) into the gun barrel. Using the multi-tool (44), tighten the assembly until just snug.
8. Install the electrode. See Electrode Replacement, page 39.
9. Install the nozzle and air cap. See Air Cap and Nozzle Replacement, page 38.
10. See Test Gun Resistance, page 31.

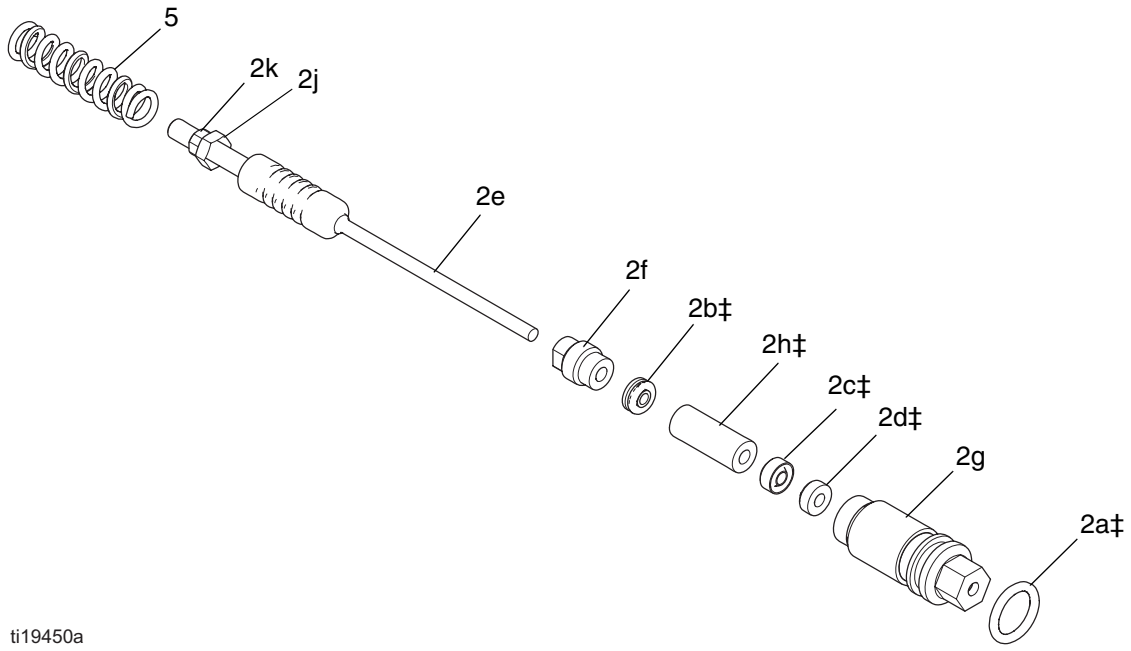


FIG. 31 . Packing Rod

Piston Repair

1. Prepare the gun for service, page 41.
2. Remove the air cap, page 42. Remove the gun shroud (26).
3. Remove the jam nut (16), actuator arm (15), and adjustment nut (16). See FIGURE 33.

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

4. Remove piston cap (13) from the rear of the gun.
5. Push on the piston rod (11) to push the piston out the back of the gun.
6. Inspect the o-rings (11d, 11e, 11f, 11g) for damage. See Table 3 and FIGURE 32.
7. Lubricate the o-rings (11d, 11e, 11f, 11g) with non-silicone grease, Part No. 111265. Do not over-lubricate.
8. Align the two stems (11c) with the holes in the gun body and press the piston assembly into the back of the gun until it bottoms.
9. Install and adjust the actuator arm, page 46.

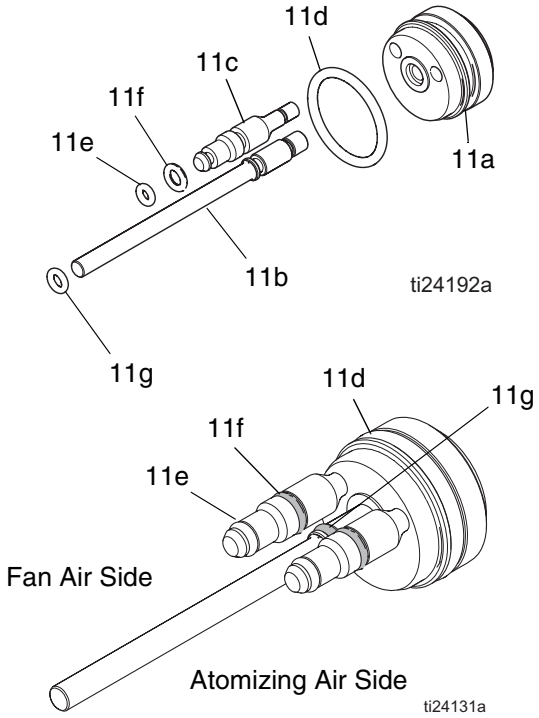


FIG. 32 . Piston O-Rings

Table 3. Piston O-Rings

Description	Function
Shaft O-Ring (11g)	Seals cylinder air along the piston rod (34b). Replace if air leaks along rod.
Front O-Ring (11e)	Air shutoff seal. Replace if air leaks from air cap when gun is de-triggered.
Back O-Ring (11f)	Separates cylinder air from fan and atomizing air.
Piston O-Ring (11d)	Replace if air leaks from small vent hole at back of manifold when gun is triggered.
O-rings included in air seal repair kit 24W390	

Adjust the Actuator Arm

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

See FIGURE 33.

1. Install the adjustment nut (16b), actuator arm (15), and jam nut (16a) onto the piston rod (11b).
2. Position the parts so there is a 0.125 in. (3 mm) gap between the actuator arm (15) and the fluid packing rod nut (E). This allows the atomizing air to actuate before the fluid.
3. Tighten the adjustment nut (16b) against the actuator arm (15). Check that the 0.125 in. (3 mm) gap has been maintained. In addition, there should be 3 mm of electrode needle travel when the gun is triggered. Adjust the jam nut position to obtain these dimensions. Tighten the jam nut (16a)
4. Test gun resistance, page 31.
5. Install the gun shroud (26) and air cap (25), page 42.
6. Install the gun onto the manifold. See page 41.

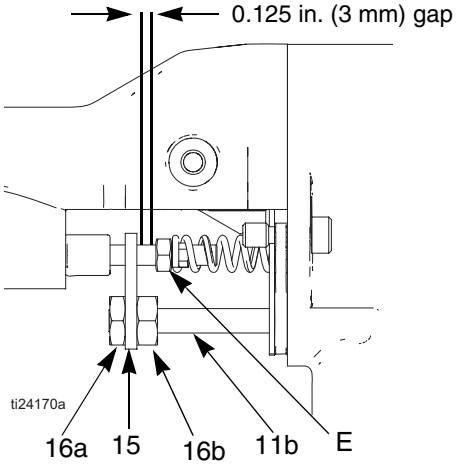


FIG. 33 . Actuator Arm Adjustment

Barrel Removal

1. Prepare the gun for service, page 41.
2. Remove the air cap, page 42. Remove the gun shroud (26).
3. Remove the adjustment nuts (16a, 16b) and actuator arm (15). See FIGURE 33.
4. Loosen the two screws (19). See FIGURE 34.

NOTICE

To avoid damaging the power supply, pull the gun barrel (1) straight away from the gun body (10). If necessary, gently move the gun barrel from side to side to free it from the gun body.

5. Hold the gun body (10) with one hand and pull the barrel (1) straight off the body. See FIGURE 34.

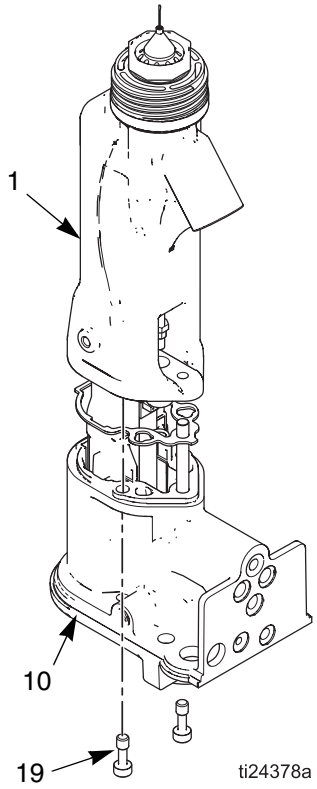


FIG. 34 . Barrel Removal

Barrel Installation

See FIGURE 35

1. Verify the gasket (9) and grounding spring (6) are in place and the gasket air holes are aligned properly. Replace the gasket if damaged.
2. Make sure the spring is in place on the tip of the power supply (7). Liberally apply dielectric grease to the tip of the power supply. Place the barrel (1) over the power supply and onto the gun body (10).
3. Tighten the two barrel screws (19) oppositely and evenly (about a half turn past snug or 20 in-lbs). Do not over-tighten.

NOTICE

To avoid damaging the gun barrel, do not over-tighten the screws (19).

4. Install and adjust the actuator arm (15), jam nut (16), and adjustment nut (16). See page 46.
5. Test gun resistance, page 31.
6. Install the gun shroud (26) and air cap, page 42.
7. Install the gun onto the manifold. See page 14.

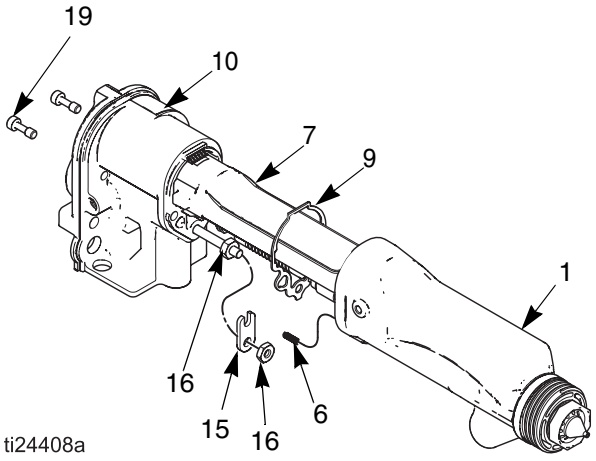


FIG. 35 . Barrel Installation

Power Supply Removal and Replacement

- Inspect the gun body power supply cavity for dirt or moisture. Clean with a clean, dry rag.
- Do not expose gasket (9) to solvents.

1. See Prepare the Gun for Service, page 37.
2. See Barrel Removal, page 42.

NOTICE

Be careful when handling the power supply (7) to avoid damaging it.

3. Grasp the power supply (7) with your hand. With a gentle side to side motion, free the power supply/turbine assembly from the gun body (10), then carefully pull it straight out.

   Smart models only: disconnect the flexible circuit (30) from the socket at the top of the gun body.

4. Inspect the power supply and turbine for damage.
5. To separate the power supply (7) from the turbine (8), disconnect the 3-wire ribbon connector (PC) from the power supply.

   Smart models only: disconnect the 6–pin flexible circuit (30) from the power supply.

   Slide the turbine up and off the power supply.

6. See Test Power Supply Resistance, page 32. Replace the power supply if necessary. To repair the turbine, see Turbine Removal and Replacement, page 44.

NOTICE

To prevent damage to the cable and possible interruption of the ground continuity, bend the turbine's 3–wire ribbon cable (PC) upward and back, so the bend faces the power supply and the connector is at the top.

7. Connect the 3-wire ribbon connector (PC) to the power supply.

   Smart models only: connect the 6–pin flexible circuit (30) to the power supply.

Tuck the ribbon forward, under the power supply. Slide the turbine (8) down onto the power supply (7).

8. Insert the power supply/turbine assembly in the gun body (10). Make sure the ground strips (EE) make contact with the gun body.

   Smart models only: align the connector of the 6–pin flexible circuit (30) with the socket (CS) at the top of the gun body. See FIGURE 36.

   Push the connector securely into the socket as you slide the power supply/turbine assembly into the gun body.

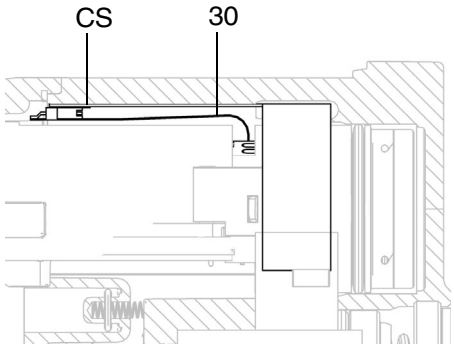


FIG. 36 . Connect Flexible Circuit

9. Make sure the gasket (9), ground spring (6), and power supply spring (7a) are in place. Replace gasket (9) if damaged. Assemble the barrel (1) to the body (10). See Barrel Installation, page 42.

10. See Test Gun Resistance, page 31.

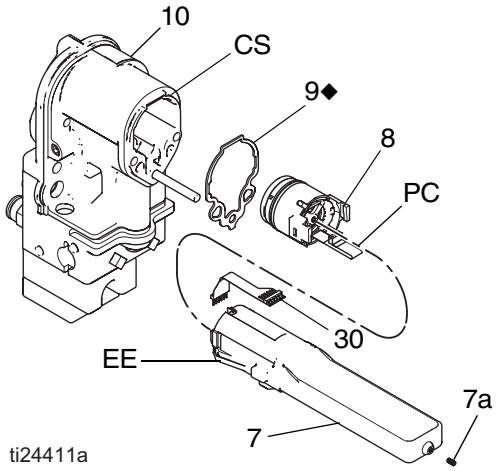


FIG. 37 . Power Supply

Turbine Removal and Replacement

NOTE: Replace turbine bearings after 2000 hours of operation. Order Part No. 24N706 Bearing Kit. Parts included in the kit are marked with a symbol (◆). See FIGURE 37 through FIGURE 40.

1. See Prepare the Gun for Service, page 37.

2. Remove the power supply/turbine assembly and disconnect the turbine. See Power Supply Removal and Replacement, page 43.

3. Measure resistance between the two outer terminals of the 3-wire connector (PC); it should be 2.0–6.0 ohms. If outside this range, replace the turbine coil (8a).

4. Using a flat blade screwdriver, pry the clip (8h) off the housing (8d). Remove the cap (8f), using a thin blade or screwdriver.

5. If necessary, rotate the fan (8e) so its blades clear the four bearing tabs (T) of the housing (8d).

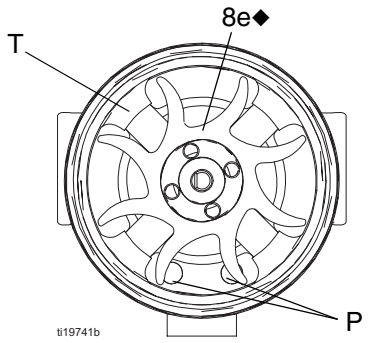


FIG. 38 . Fan Orientation

6. Push the fan and coil assembly (8a) out the front of the housing (8d).

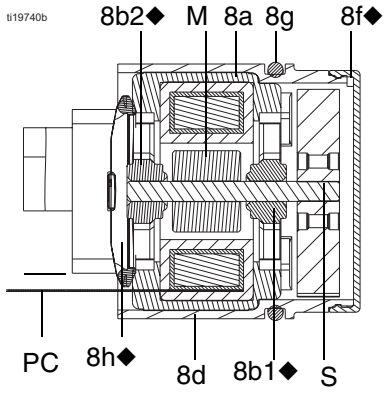


FIG. 39 . Turbine Cross-Section.

NOTICE
Do not scratch or damage the magnet (M) or shaft (S). Do not pinch or damage the 3–wire connector (PC) when disassembling and reassembling the bearings.

7. Hold the coil assembly (8a) on a workbench with the fan end facing up. Using a wide blade screwdriver, pry the fan (8e)off the shaft (S).

8. Remove the top bearing (8b2).

9. Remove the bottom bearing (8b1).

10. Install the new bottom bearing (8b1.) on the long end of the shaft (S). The flatter side of the bearing must face away from the magnet (M). Install in the coil (8a) so the bearing blades are flush with the surface of the coil.

11. Press the new top bearing (8b2.) onto the short end of the shaft so the bearing blades are flush with the surface of the coil (8a). The flatter side of the bearing must face away from the coil.

12. Hold the coil assembly (8a) on a workbench with the fan end facing up. Press the fan (8e.) onto the long end of the shaft (S).The fan blades must be oriented as shown in FIGURE 38.

13. Carefully press the coil assembly (8a) into the front of the housing (8d.) while aligning the pin on the coil with the slot in the housing. The 3–wire connector (PC) must be positioned below the wider notch (W) of the housing tabs, as shown in Fig. 45. Be sure the coil alignment pins (P) are positioned as shown in Fig. 44.

14. Rotate the fan (8e) so its blades clear the four bearing tabs (T) at the back of the housing. Ensure that the blades of the bottom bearing (8b1.) align with the tabs.

15. Seat the coil fully into the housing (8d.). Secure with the clip (8h.),ensuring that its tabs engage the slots in the housing.

16. Ensure that the o-ring (8g) is in place. Install the cap (8f).

17. Install the turbine on the power supply, and install both parts in the gun body. See Power Supply Removal and Replacement, page 43.

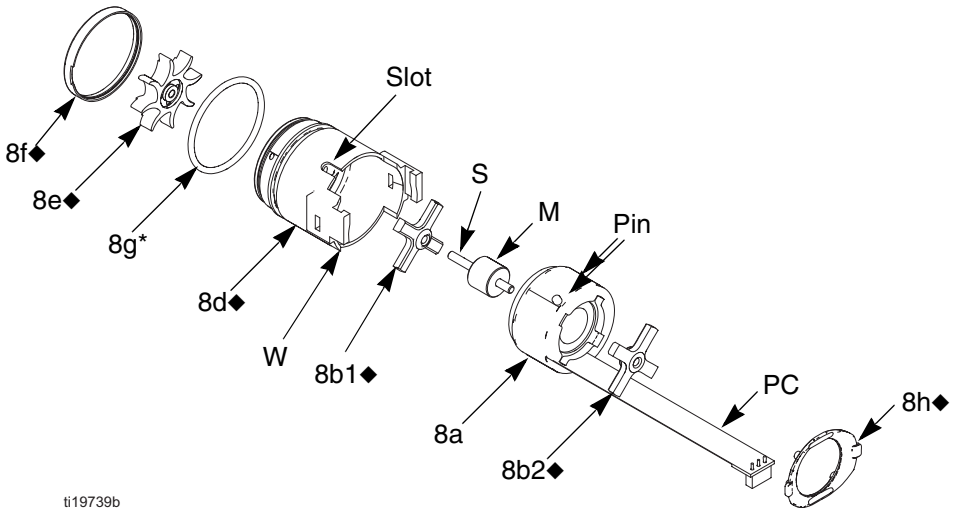
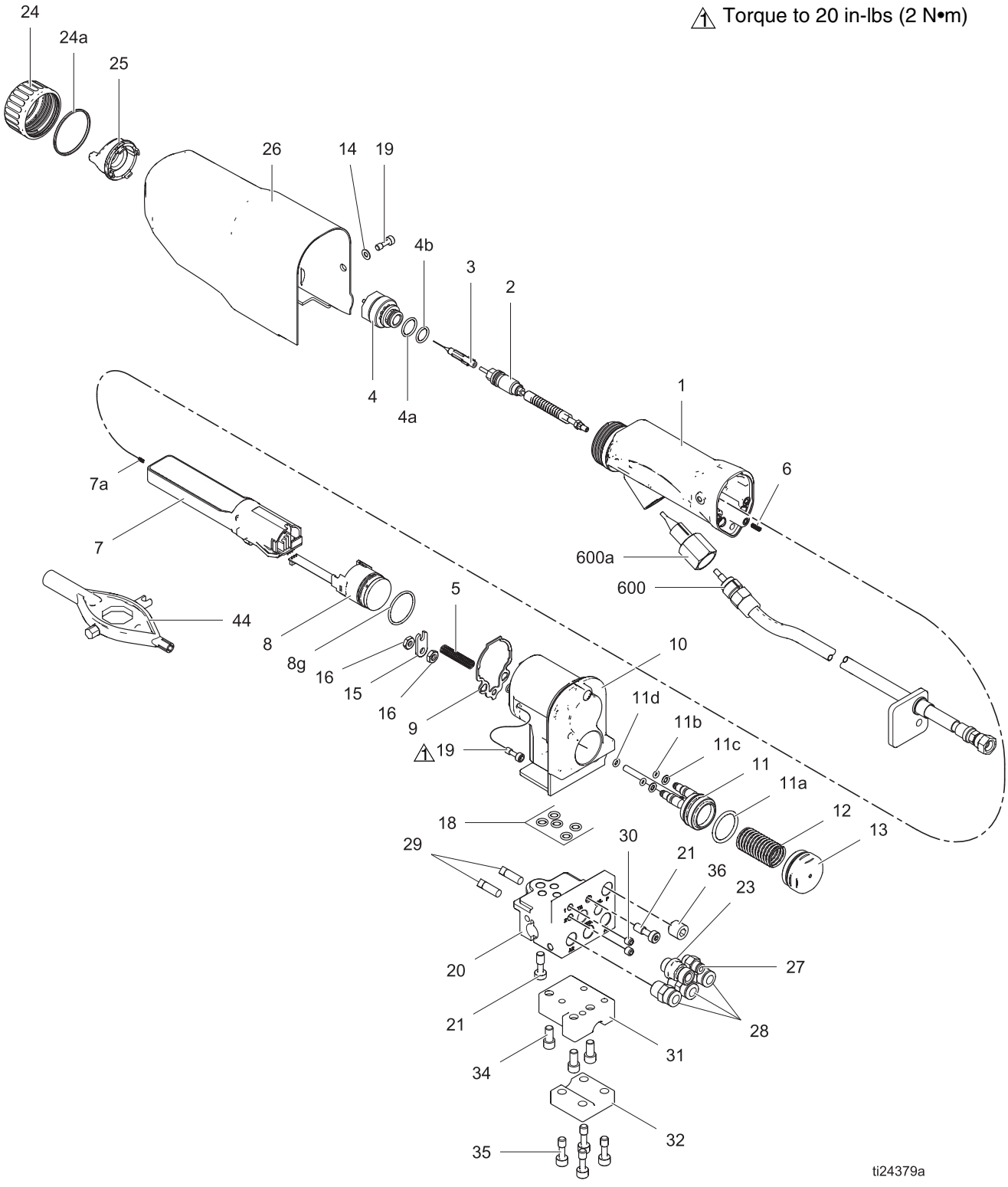


FIG. 40 . Turbine

Parts

Standard Pro Xp Auto Waterborne Air Spray Gun Models

LA1T18, Waterborne, Rear Manifold



LA1T18, Waterborne, Rear Manifold

Ref. No.	Part No.	Description	Qty
1	24W873	BODY, gun assy (includes 9)	1
2	24N655	See **Packing Rod Assembly**, page 54	
3	24N652	NEEDLE, electrode, WB	1
4	24N616	NOZZLE, fluid; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	185111	SPRING, compression	1
6	197624	SPRING, compression	1
7	24N662	POWER SUPPLY, 60 kV, WB	1
7a	24N979	SPRING	1
8	24N664	See **Turbine Assembly**, page 55	
8g*	110073	O-RING, packing	1
9■◆	24N699	GASKET, barrel	1
10	24W381	BODY, Auto XP, STD, WB (includes 18, 19)	1
11	24W396	PISTON, assy, actuation, auto	1
11a	17B704	O-RING, packing	1
11b	111504	O-RING, packing	2
11c	112319	O-RING, packing	2
11d	111508	O-RING, packing	1
12	112640	SPRING, compression	1
13	24W397	CAP, piston, actuation	1
14	513505	WASHER, plain #10 SST	1
15	24W398	ARM, fluid actuator, XP (Includes 16 qty 2)	1
16	100166	NUT, full hex	2
18■	111450	PACKING, O-RING	5
19	24N740	SCREW, ES gun (Includes 2)	4
20	24W392	MANIFOLD, rear inlet, Auto XP (includes 21, 23, 27, 28, 29, 36)	1
21	24W399	SCREW, modified, 1/4-20, XP Auto	2
23	24W411	FITTING, Adapter, M12 TO 1/4, LH, XP	1
24	24N644	RING, retainer, assy; includes 24a	1
24a■	198307	PACKING, u-cup; UHMWPE	1
25	24N477	AIR CAP, machining, black	1
26	24W389	COVER, shroud, Auto XP WB	1
27	114263	FITTING, connector, male	1
28	115950	FITTING, connector, 1/4npt (M), 5/16T	3
29	110465	SCREW, set	2
30	102207	SCREW, set, SCH	2
31*		BRACKET, strain relief, WB tube	1
32*		CLAMP, strain relief, SM WB	1
34*	GC2248	SCREW, SHDC, SS, .250x.50	3
35*	24X482	FASTENER, retainer (pack of 4)	1
36	117560	SCREW, set, socket head	1
37	070303	LUBRICANT, grease	1
38	070311	SEALANT, anaerobic	1
39	070321	LUBRICANT, grease	1
40	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
43▲	179791	TAG, warning (not shown)	1
44	276741	MULTI-TOOL (shipped loose)	1
45	107460	TOOL, wrench, ball end	1
600	24W597	See **Shielded Waterborne Fluid Hose 24W597**, page 65	
600a	16N953	See **Shielded Waterborne Fluid Hose 24W597**, page 65	

▲ Replacement Warning labels, signs, tags, and cards are available at no cost.

■ Included in air seal repair kit 24W390 (purchase separately)

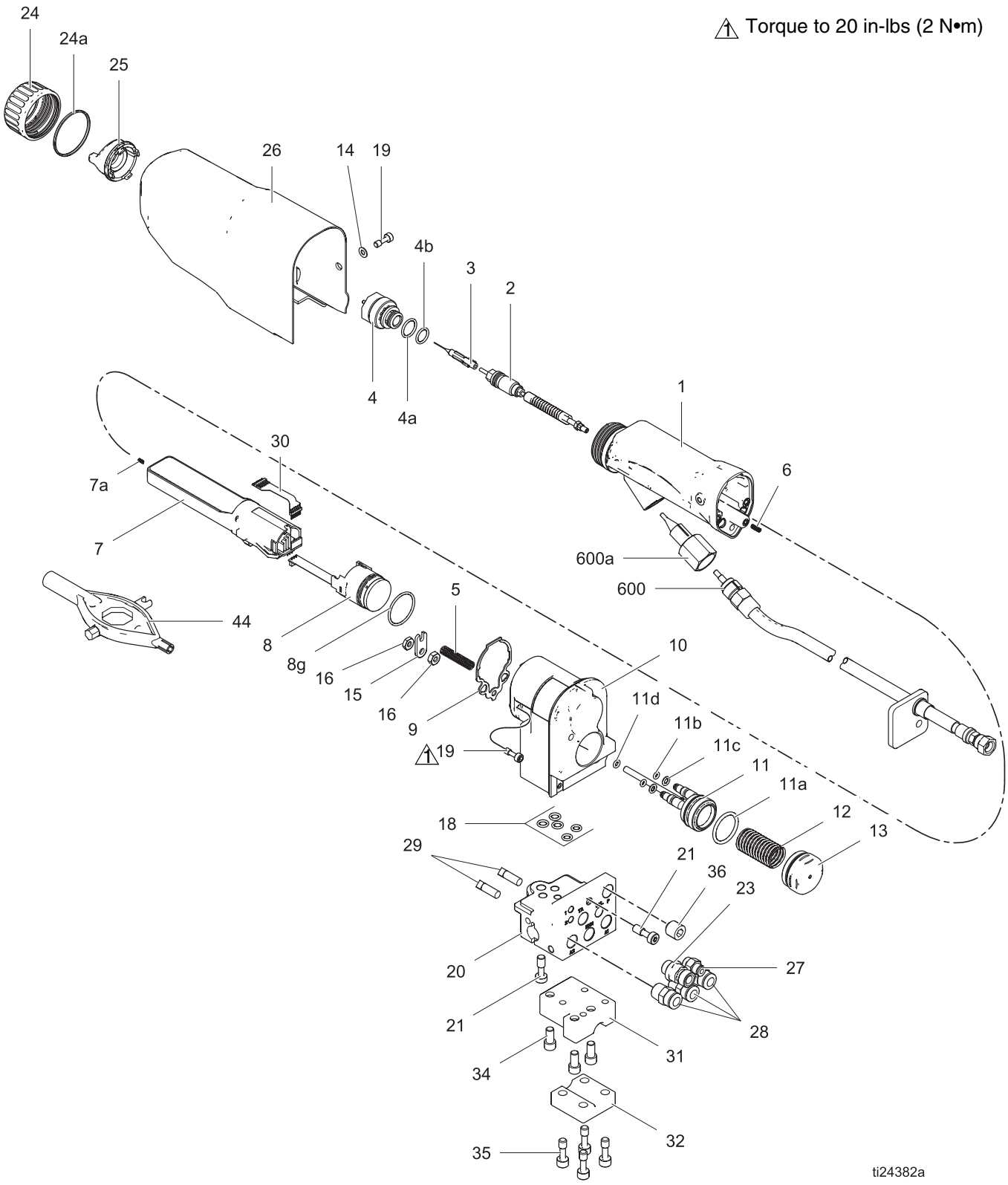
* Included in WB hose mount kit 24W878 (purchase separately)

❖ Included in Rear Manifold Repair Kit 24W392 (purchase separately)

◆ Included in Turbine Assembly 24N664 (purchase separately). See **Turbine Assembly**, page 55.

Smart Pro Xp Auto Waterborne Air Spray Gun Model

LA1M18, Waterborne, Rear Manifold



LA1M18, Waterborne, Rear Manifold

Ref. No.	Part No.	Description	Qty
1	24W873	BODY, gun assy (includes 9)	1
2	24N655	See **Packing Rod Assembly**, page 54	1
3	24N652	NEEDLE, electrode	1
4	24N616	NOZZLE, fluid; includes 4a and 4b	1
4a	24N645	O-RING, conductive	1
4b	111507	O-RING; fluoroelastomer	1
5	185111	SPRING, compression	1
6	197624	SPRING, compression	1
7	24N662	POWER SUPPLY, 60 kV, WB	1
7a	24N979	SPRING	1
8	24N644	See **Turbine Assembly**, page 55	
8g■	110073	O-RING, packing	1
9■◆	24N699	GASKET, barrel	
10	24W866	BODY, assy, Auto XP, WB, Smart, Rear (includes 10, 19)	1
11	24W396	PISTON, assy, actuation, auto	1
11a	17B704	O-RING, packing	1
11b	111504	O-RING, packing	2
11c	112319	O-RING, packing	2
11d	111508	O-RING, packing	1
12	112640	SPRING, compression	1
13	24W397	CAP, piston, actuation	1
14	513505	WASHER, plain #10 SST	1
15	24W398	ARM, fluid actuator, XP	1
16	100166	NUT, full hex	2
18■	111450	PACKING, O-RING	5
19	24N740	SCREW, ES gun (includes 2)	4
20	24W392	MANIFOLD, rear inlet, Auto XP (includes 21, 23, 27, 28, 29, 36)	1
21	24W399	SCREW, modified, 1/4-20, XP Auto	2
23	24W411	FITTING, Adapter, M12 TO 1/4, LH, XP	1
24	24J234	RING, retainer, assy; includes 24a	1
24a■	198307	PACKING, u-cup; UHMWPE	1
25	24N477	AIR CAP, machining, black	1
26	24W389	COVER, shroud, Auto XP WB	1
27	114263	FITTING, connector, male	1
28	115950	FITTING, connector, 1/4npt (M), 5/16T	3
29	110465	SCREW, set	2
30	245265	CIRCUIT, flexible	2
31*		BRACKET, strain relief, WB tube	1
32*		CLAMP, strain relief, SM WB	1
34*	GC2248	SCREW, SHDC, SS, .250x.50	3
35*	24X482	FASTENER, retainer (pack of 4)	1
36	117560	SCREW, set. socket head	1
37	070303	GREASE, lubricant	1
38	070311	SEALANT, anaerobic	1
39	070321	GREASE, lubricant	1
40	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
43▲	179791	TAG, warning (not shown)	1
44	276741	MULTI-TOOL (shipped loose)	1
45	107460	TOOL, wrench, ball end	1
80	24W035	CONTROL MODULE, Pro Xp Auto (not shown). See 332989.	1
600	24W597	See **Shielded Waterborne Fluid Hose 24W597**, page 65	
600a	16N953	See **Shielded Waterborne Fluid Hose 24W597**, page 65	

▲ Replacement Warning labels, signs, tags, and cards are available at no cost.

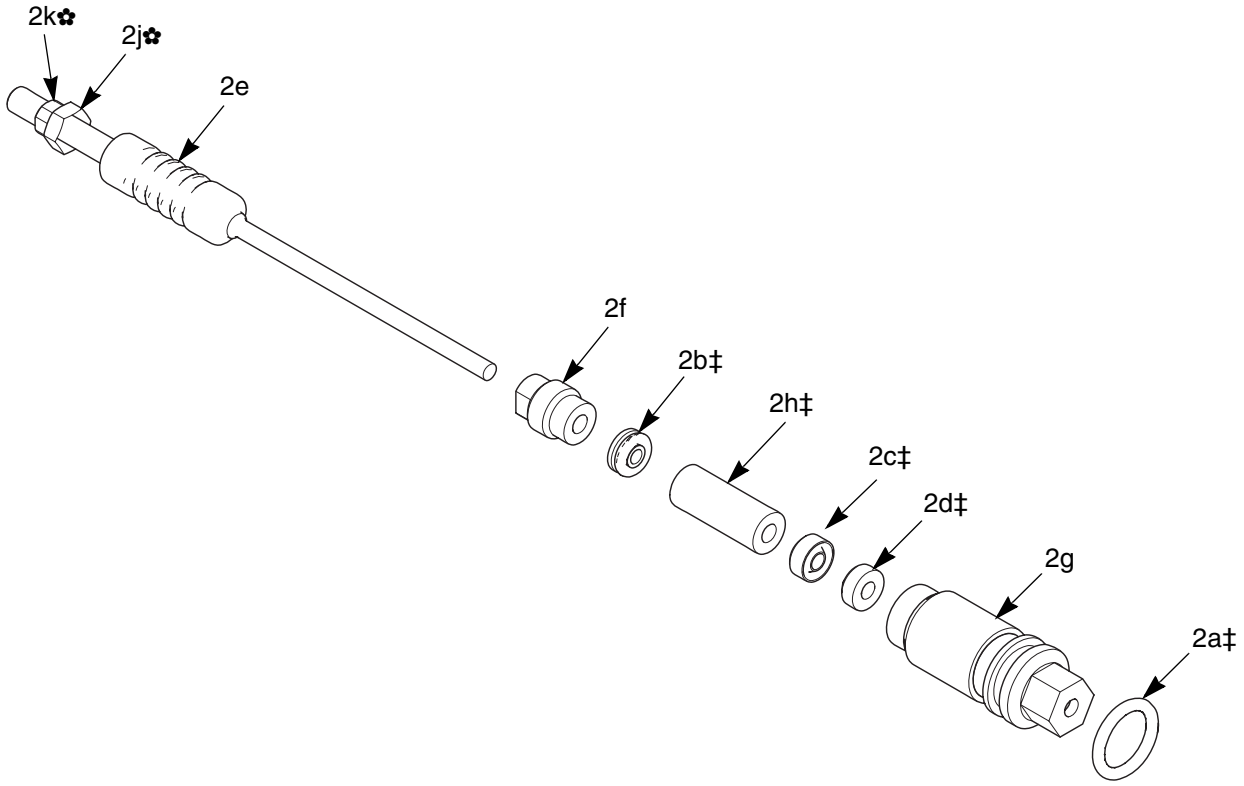
* Included in WB Hose Mount Kit 24W878 (purchase separately)

■ Included in air seal repair kit 24W390 (purchase separately)

◆ Included in Turbine Assembly 24N664 (purchase separately). See **Turbine Assembly**, page 55.

Packing Rod Assembly

Part No. 24N655 Packing Rod Assembly
Includes items 2a-2k



ti18641a

Ref. No.	Part No.	Description	Qty
2a‡	111316	O-RING	1
2b‡	116905	SEAL	1
2c‡	178409	PACKING, fluid	1
2d‡	178763	PACKING, needle	1
2e	24N703	ROD, packing (includes items 2j and 2k)	1
2f	197641	NUT, packing	1
2g	185495	HOUSING, packing	1
2h‡	186069	SPACER, packing	1

Ref. No.	Part No.	Description	Qty
2j✿	--------	NUT, trigger adjustment (part of item 2e)	1
2k✿	--------	NUT, trigger adjustment (part of item 2e)	1

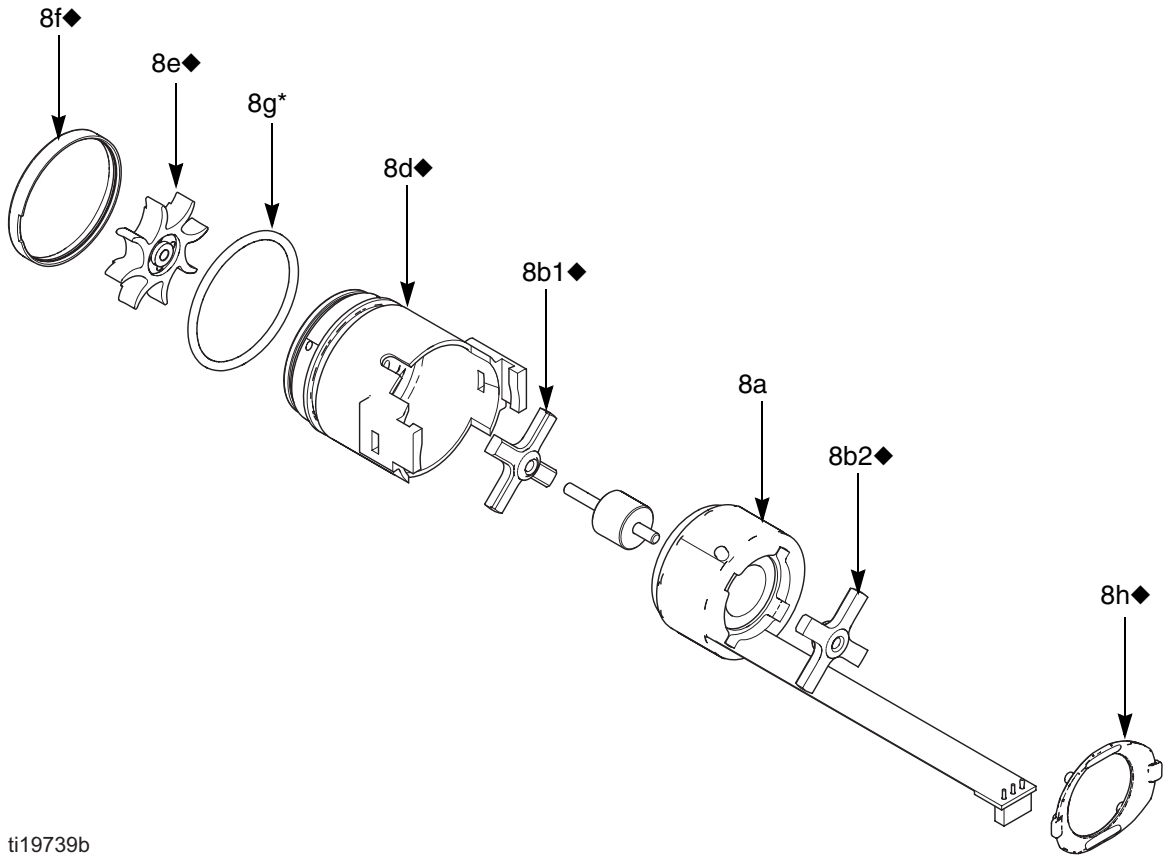
‡ These parts are included in Fluid Seal Repair Kit 24W391 (purchase separately).

✿ These parts are included in Trigger Adjustment Nut Kit 24N700 (purchase separately).

Parts labeled ------ are not available separately

Turbine Assembly

Part No. 24N664 Turbine Assembly



Ref. No.	Part No.	Description	Qty
8a	24N705	COIL, turbine	1
8b◆	24N706	BEARING KIT (includes two bearings, item 8e fan, and one item 8h clip)	1
8d◆	24N707	HOUSING; includes item 8f	1
8e◆	------	FAN; part of item 8b	1
8f◆	------	CAP, housing; part of item 8d	1
8g*	110073	O-RING	1
8h◆	24N709	CLIP; package of 5 (one clip included with item 15b)	1
9*◆	24N699	GASKET, barrel (not shown) See page 50.	1

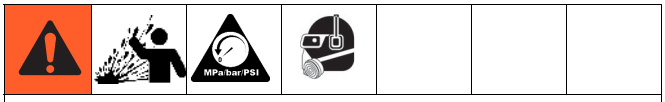
* These parts are included in Air Seal Repair Kit 24W390 (purchase separately).

◆ These parts are included in Bearing Kit 24N706 (purchase separately).

Parts labeled ------ are not available separately

Air Caps and Fluid Nozzles

Fluid Nozzle Selection Chart



To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 24 before removing or installing a fluid nozzle and/or air cap.

Fluid Nozzle Part No.	Color	Description	Orifice Size, mm (in.)
24N613	Black	For standard coatings	0.75 (.029)
24N614			1.0 (.042)
24N615			1.2 (.047)
24N616			1.5 (.055)
24N617			1.8 (.070)
24N618			2.0 (.079)
24N619			0.55 (.022)
24N620	Blue	With hardened seat, for abrasives and metallics	0.75 (.029)
24N621			1.0 (.042)
24N622			1.2 (.047)
24N623			1.5 (.055)
24N624			1.8 (.070)
24N625			2.0 (.079)

Fluid Nozzle Performance Charts

Use the following procedure to select the proper fluid nozzle for your application.

1. For each fluid nozzle performance chart, find the point on the graph corresponding to your desired flow rate and viscosity. Mark the point on each graph with a pencil.
2. The thick vertical line in each graph represents the target flow rate for that nozzle size. Find the graph that has the marked point closest to the thick vertical line. This is the recommended nozzle size for your application. Significantly exceeding the target flow rate may result in lower spray performance due to excessive fluid viscosity.
3. From the marked point, move across to the vertical scale to find the required fluid pressure. If the required pressure is too high, use the next largest nozzle size. If the fluid pressure is too low, (<0.35 bar, 3.5 kPa, 5 psi), use the next smallest nozzle size.

Key to Fluid Nozzle Performance Charts

NOTE: Fluid pressures are measured at the spray gun inlet.

260 Centipoise Fluid	———
160 Centipoise Fluid	— — — — —
70 Centipoise Fluid	—— · —— · ——
20 Centipoise Fluid	- - - - - - - - - - - - - -

Table 4. Orifice Size: 1.0 mm (0.040 in.)

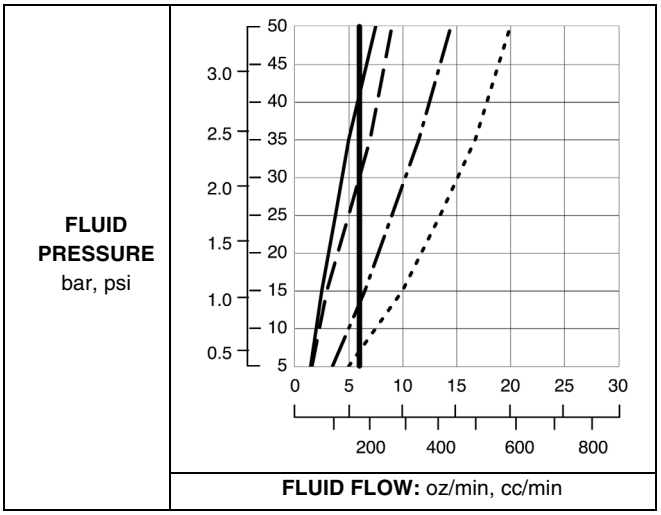


Table 5. Orifice Size: 1.2 mm (0.047 in.)

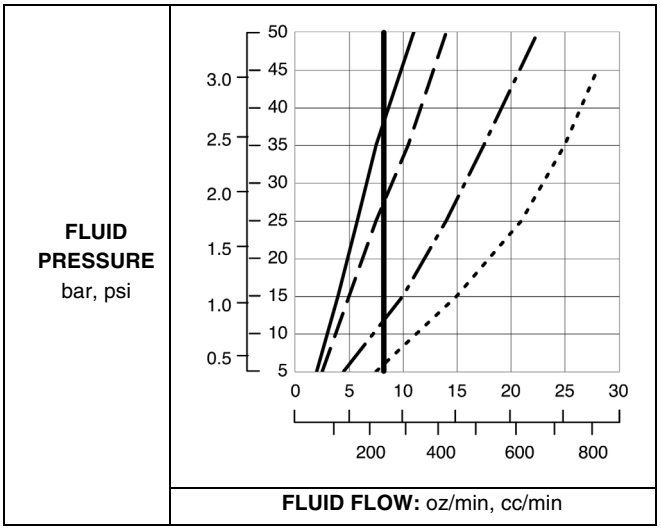


Table 6. Orifice Size: 1.5 mm (0.059 in.)

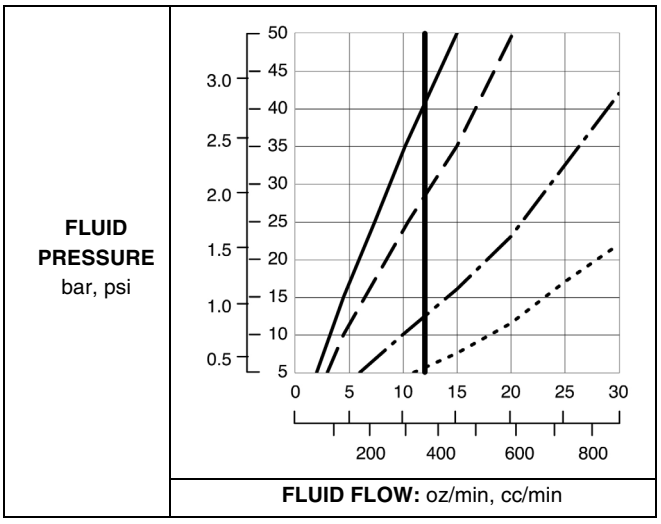


Table 7. Orifice Size: 1.8 mm (0.070 in.)

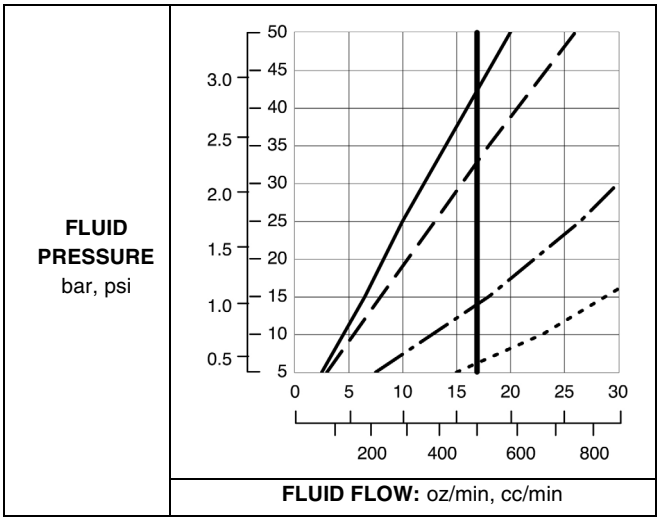
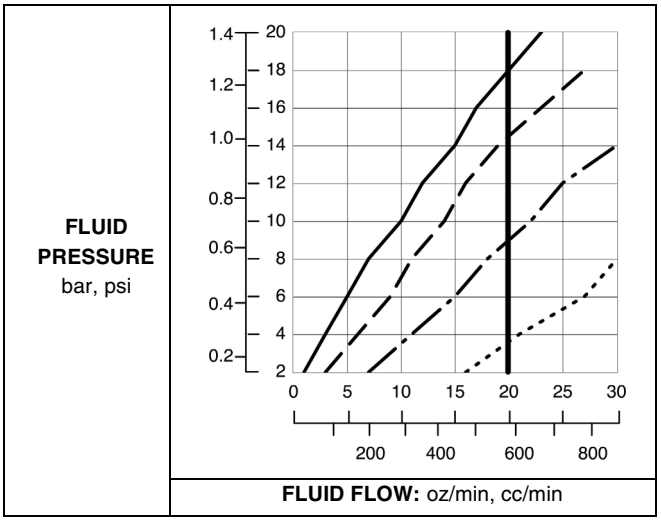
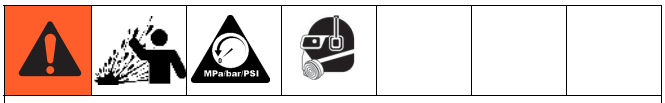


Table 8. Orifice Size: 2.0 mm (0.079 in.)



Air Cap Selection Chart



To reduce the risk of an injury, follow the **Pressure Relief Procedure** before removing or installing a fluid nozzle and/or air cap.

NOTE: All air cap pattern shapes and lengths in the following chart were measured under the following conditions. Pattern shape and length are material dependent.

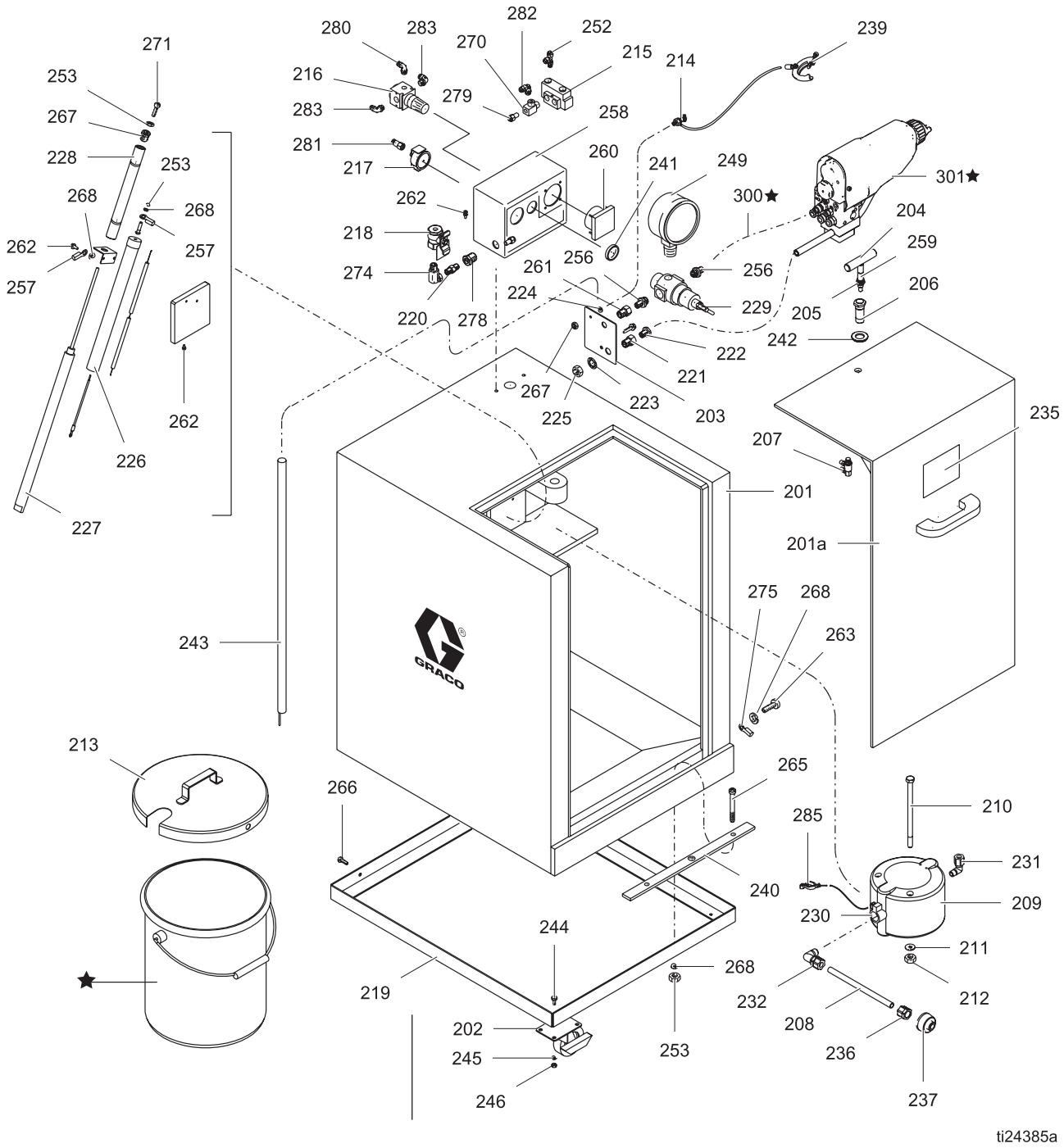
- *Distance to target:* 10 in. (254 mm)
- *Inlet air pressure:* 50 psi (34 kPa, 3.4 bar).
- *Fan air:* adjusted for maximum width
- *Fluid flow rate:* 10 oz/min (300 cc/min)

Part No. (color)	Pattern Shape	Length in. (mm)	Recommended Fluid Viscosity, in centipoise (cp) at 70°F (21°C)◆	Recommended Production Rates	Transfer Efficiency	Atomization	Cleanliness
24N438 (black)	Round end	15-17 (381-432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N279 (black)	Round end	14-16 (356-406)	Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good
24N376 (black) 24N276 (blue) 24N277 (red) 24N278 (green)	Tapered end	17-19 (432-483)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Best	Better	Better
24N274 (black)	Tapered end	12-14 (305-356)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Good	Good	Best
24N275 (black)	Tapered end	14-16 (356-406)	Light to medium (20-70 cp), and high solids (360+ cp), aerospace coatings	Up to 25 oz/min (750 cc/min)	Best	Good	Best
24N439 (black)	Tapered end	11-13 (279-330)	For use with 2.0 mm nozzles. Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 20 oz/min (600 cc/min)	Good	Best	Better
24N477 (black)	Round end	15-17 (381-432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N453 (black)	Round end	14-16 (356-406)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good

◆ Centipoise = centistokes x fluid specific gravity.

Isolation Enclosure

Part No. 233825 Waterborne Isolation Enclosure, for use with shielded waterborne fluid hose



Ref. No.	Part No.	Description	Qty
201	------	CABINET, enclosure; includes 201a	1
201a	15A947	DOOR, cabinet	1
202	116993	CASTER, brake	4
203	15A660	PLATE	1
204	15A551	T-HANDLE, latch	1
205	15A545	STEM, handle, door	1
206	15A524	HOUSING, latch	1
207	113061	SWITCH, push, air	1
208	------	TUBE; 1/2 in. (13 mm) OD; polyethylene	A/R
209	233501	PUMP, diaphragm; SST; see 309303	1
210	------	SCREW, hex hd cap; 5/16–18 x 5.5 in. (140 mm)	2
211	------	WASHER, plain; 0.344 in. ID	2
212	------	NUT, lock; 5/16–18	2
213	241005	COVER, pail	1
214	104029	LUG, ground	1
215	116989	VALVE, air	1
216	111804	REGULATOR, air	1
217	113060	GAUGE, air; 1/8 npt	1
218	116473	BALL VALVE; 1/4 npt (f)	1
221	185547	FERRULE, housing; for 24N580, 24P629, and 233825	1
	15B932	FERRULE, housing; for 24P630, 24P631, and 246511	1
222	198663	FERRULE; for 24N580, 24P629, and 233825	1
	190863	FERRULE; for 24P630, 24P631, and 246511	1
223	101390	WASHER, lock, internal tooth	1
224	154636	WASHER, plain; 0.625 in. ID	2
225	185548	NUT	1
226	190410	RESISTOR, bleed	1
227	116988	CYLINDER ROD	1
228	15A518	HOUSING, cylinder rod	1
229	104267	REGULATOR, air	1
230	------	BUSHING; plastic; 3/4 x 1/2 npt	1
231	114456	ELBOW, tube; 3/8 npt x 3/8 in. (10 mm) OD tube	1
232	116315	ELBOW, tube; 3/8 npt x 1/2 in. (13 mm) OD tube	1
235▲	15A682	LABEL, warning	1
236	116316	FITTING, tube; 1/2 npt x 1/2 in. (13 mm) OD tube	1
237	218798	STRAINER, 16 mesh; SST	1
238	114958	STRAP, tie	3
239	222011	GROUND WIRE; 25 ft (7.6 m)	1
240	234018	STRIP, grounding; aluminum	1
241	110209	NUT, regulator	11
242	114051	WASHER, shim, latch	1
243	210084	ROD, ground	1
244	------	SCREW, hex hd; 1/4–20 x 5/8 in. (16 mm)	16
245	------	WASHER, plain; 1/4 in. (6 mm)	16
246	------	NUT, hex; 1/4–20	16
247	107257	SCREW, thread-forming	1
248	------	TUBE; 1/4 in. (6 mm) OD; nylon	A/R
249	160430	GAUGE, air	1
251	------	WIRE, 10 gauge; green with yellow stripe	1
252	------	CONNECTOR, swivel tee; 1/8 npt x 5/32 in. (4 mm) tube	1
253	------	NUT, hex; 10–32	1
256	162449	NIPPLE, reducing; 1/2 npt x 1/4 npt	2
257	101874	TERMINAL, ring	5
258	116990	BOX, control	1
259	113983	RING, retaining; 1/2 in. (13 mm)	1
260	237933	METER, 0–90 kV	1
261	113336	ADAPTER; 1/4 npt	1
262	------	SCREW, pan hd; 10–32 x 5/8 in. (16 mm)	4
263	------	SCREW, pan hd; 10–32 x 1/4 in. (6 mm)	1
264	------	HOLDER, tie	3
265	------	SCREW, button hd; 10–24 x 1.5 in. (38 mm)	2
266	------	SCREW, button hd; 10–32 x 1.0 in. (25 mm)	2
267	------	NUT, hex; M5 x 0.8	2
268	------	WASHER, lock; no. 10	9
270	116991	TEE, run, manifold	1
271	203953	SCREW, hex hd cap with patch; 10–24 x 3/8 in. (10 mm)	1
272	------	WIRE, 14 gauge; red	A/R
273	------	WIRE, ground, 14 gauge; green with yellow stripe	A/R
274	155541	UNION, swivel; 1/4 npt	1
275	114261	TERMINAL, ring; no. 10	1
276	15A780	PLUG, hex hd	1
278	117314	BULKHEAD CONNECTOR; 1/4 npt	1
279	113319	CONNECTOR, tube; 1/4 npt x 3/8 in. (10 mm) OD tube	2
280	------	ELBOW, tube	1
281	------	FITTING, tube; 1/8 npt x 5/32 in. (4 mm) OD tube	1

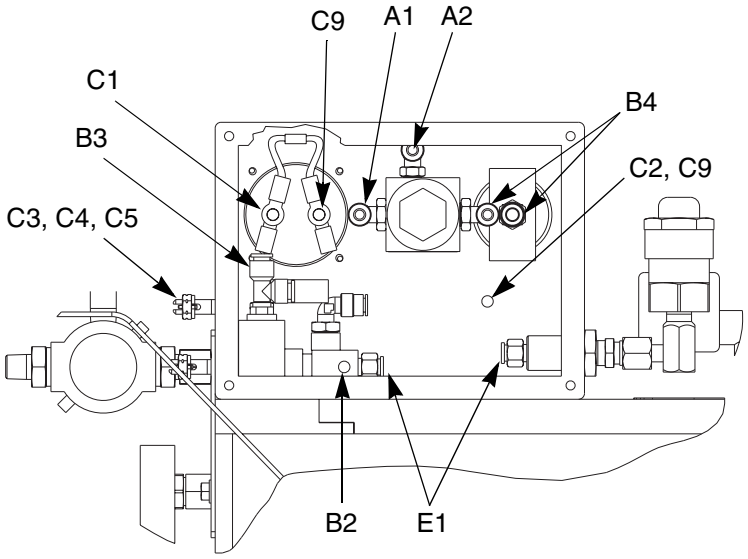
Ref. No.	Part No.	Description	Qty
282	------	SWIVEL, tube; 1/4 npt x 1/4 in. (6 mm) OD tube	4
283	------	SWIVEL, tube; 1/8 npt x 5/32 in. (4 mm) OD tube	2
285	112791	CLAMP	
286	------	TUBE; 3/8 in. (10 mm) OD	A/R
300★	235070	HOSE, air, grounded; 0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread; red cover with stainless steel braid ground path; 25 ft (7.6 m) long	1
301★	LA1M18	GUN, see **Smart Pro Xp Auto Waterborne Air Spray Gun Model**, page 52	1

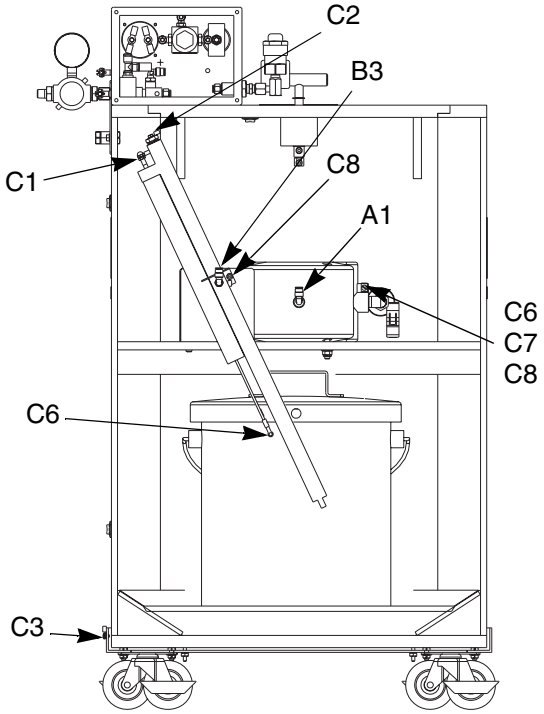
▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.

★ The air hose (300) and gun (301) are not included with 233825 Isolation Enclosure. They are shown for illustrative purposes only. The pail is shown for illustrative purposes but is not included.

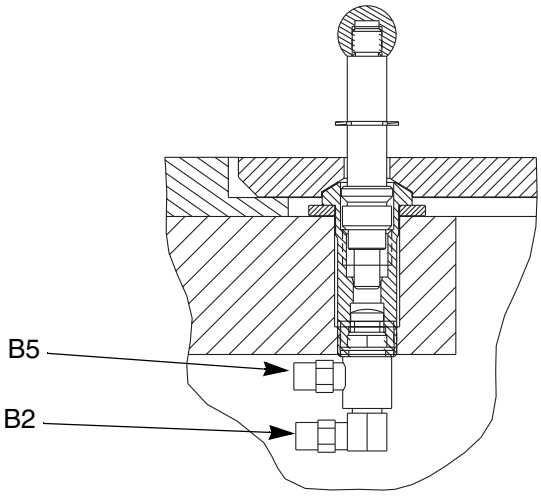
Tubing and Wiring

Detail Views of Control Box





Detail View of Door Interlock Switch



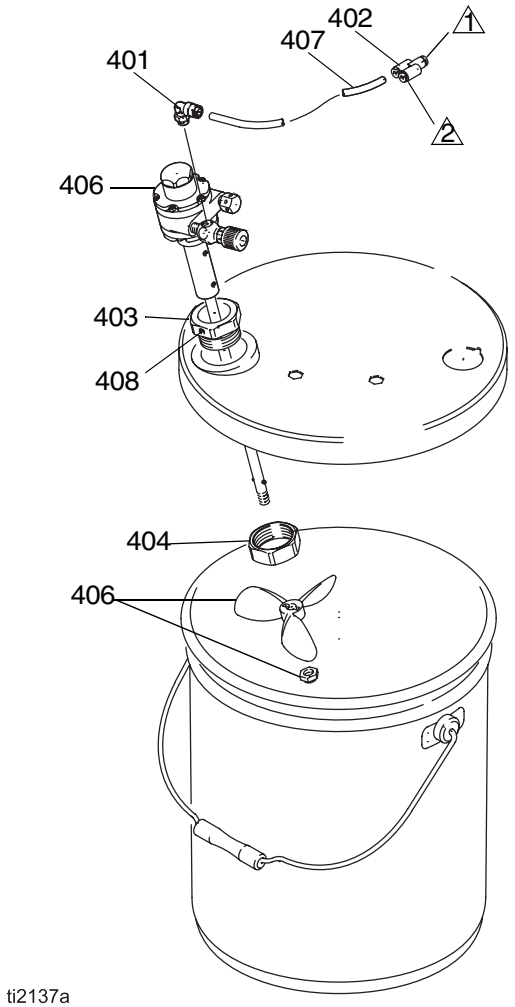
Tubing and Wiring Chart

Use the diagrams to find the connection points for the tubing and wiring listed below

Code	Ref. No.	Length in. (mm)	Description
A1	248	20 (508)	1/4 OD tube, regulator (216) to pump
A2	248	9 (229)	1/4 OD tube, regulator (216) to manifold
B2	249	17 (432)	5/32 OD tube, manifold air to door interlock switch
B3	249	20 (508)	5/32 OD tube, valve tee to cylinder
B4	249	5 (127)	5/32 OD tube, regulator (216) to gauge (217)
B5	249	22 (559)	5/32 OD tube, valve tee to door interlock switch
C1	272	9 (229)	red 14 gauge wire from top of bleed resistor to meter
C2	251	8 (204)	green/yellow 14 gauge wire from internal box ground lug to cylinder cap
C2	273	34 (864)	green/yellow 10 gauge wire from external ground lug to cart
C4	239	n/a	green/yellow 25 ft (7.6 m) ground wire with clamp, from external ground lug to true earth ground
C5	243	n/a	green/yellow 10 gauge wire from external ground lug to ground probe
C6	226	n/a	red wire from bleed resistor to pump
C7	272	16 (407)	red 14 gauge wire from pump to pail cover with clamp
C8	272	12 (305)	red 14 gauge wire from pump (209) to ground on cylinder bracket
C9	251	n/a	green/yellow 10 gauge wire from meter (+) to internal box ground lug
E1	286	4 (102)	3/8 OD tube, bulkhead to manifold

Agitator Kit 245895

To keep fluid mixed and prevent settling out. Includes items 401-408.

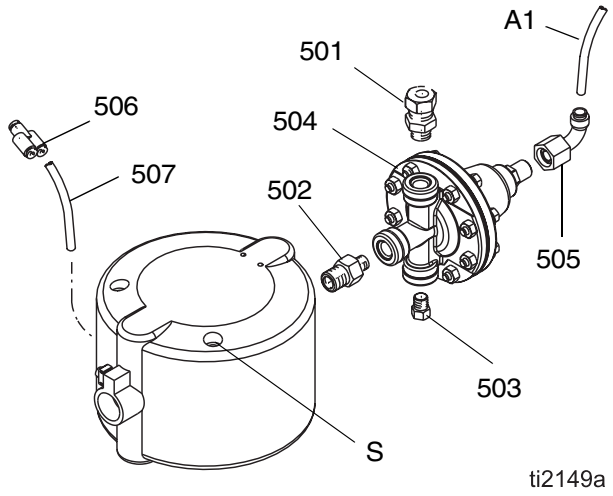


ti2137a

Ref. No.	Part No.	Description	Qty
401	112698	ELBOW, swivel; 1/8 npt(m) x 1/4 in. (6 mm) OD tube	1
402	114158	FITTING, adapter, Y; 1/4 in. (6 mm) OD tube; m x f x f	1
403	193315	COLLAR, mounting, agitator	1
404	193316	NUT, collar, agitator	1
405	197298	COVER, pail; 5 gal. (19 liter)	1
406	224571	AGITATOR; see manual 306565	1
407	purchase locally	TUBE, nylon; 1/4 in. (6 mm) OD; 4 ft (1.22 m)	1
408	110272	SCREW, set, socket hd; 1/4–20 x 1/4 in. (6 mm)	1

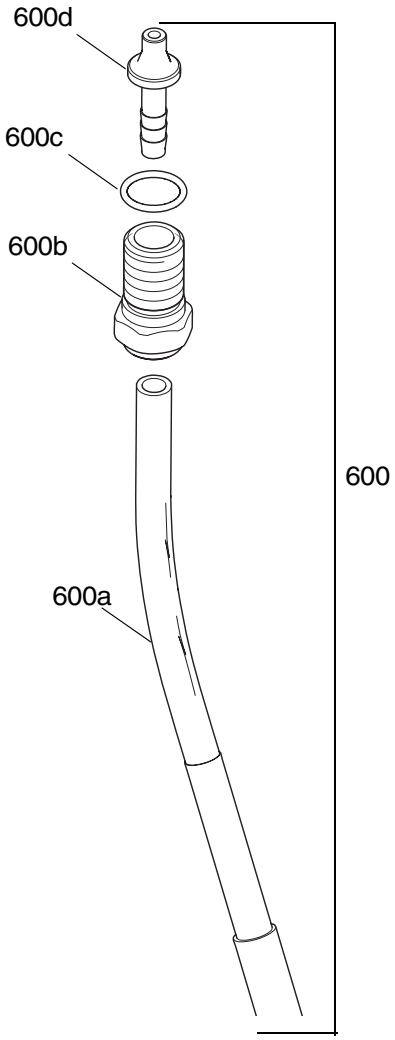
Fluid Regulator Kit 245944

To allow precise fluid pressure regulation at the gun. Includes items 501-507.



Ref. No.	Part No.	Description	Qty
501	110078	FITTING, tube, fluid; 1/4 npt(m) x 3/8 in. (10 mm) tube	1
502	113070	NIPPLE, reducer; 3/8 npt x 1/4 npt	1
503	113576	PLUG; 1/4 npt	1
504	236281	REGULATOR, fluid; see manual 308325	1
505	C20350	ELBOW, 90°; 1/4 npt(f) x 1/4 in. (6 mm) OD tube	1
506	114158	FITTING, adapter, Y; 1/4 in. (6 mm) OD tube; m x f x f	1
507	purchase locally	TUBE, nylon; 1/4 in. (6 mm) OD; 4 ft (1.22 m)	1

Shielded Waterborne Fluid Hose 24W597



Ref. No.	Part No.	Description	Qty
600	24W597	HOSE, assy, fluid, WB, 25 ft (7.6m)	1
	24W598	HOSE, assy, fluid, WB,50 ft (15.2 m)	1
600a	537107	HOSE, PTFE 1/4 ID	1
600b	16N953	FITTING, connector, barrel, WB	1
600c	102982	PACKING, o-ring	1
600d	16N916	FITTING, seal, fluid, WB	1

Accessories

Smart Model Accessories and Fiber Optic Cables

Part No.	Description
24W035	Pro Xp Auto Control Module. See 332989 for details.

Fiber Optic Cables for Gun

See item V in FIGURE 12 on page 18. Connect gun manifold to Pro Xp Auto Control Module. See 332989.

Part No.	Description
24X003	Fiber Optic Cable, 25 ft (7.6 m)
24X004	Fiber Optic Cable, 50 ft (15 m)
24X005	Fiber Optic Cable, 100 ft (30.5 m)
Fiber Optic Cable Repair Kit	
24W875	Parts necessary to replace damaged ends on one cable assembly.

Air Line Accessories

Grounded Air Hose with stainless steel braid ground path (Red)

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

Part No.	Description
235068	6ft(1.8m)
235069	15 ft (4.6 m)
235070	25 ft (7.6 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

Bleed-Type Master Air Valve

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

Relieves air trapped in the air line between this valve and the pump air motor when closed.

Part No.	Description
107141	3/4 npt

Air Line Shutoff Valve

150 psi (10 bar, 1.0 MPa) Maximum Working Pressure

For turning air to gun on or off.

Part No.	Description
224754	1/4 npsm(m) x 1/4 npsm(f) left-hand thread.

Fluid Line Accessories

Shielded Waterborne Fluid Hose

Part No.	Description
24W597	25 ft (7.6 m)
24W598	50 ft (15.2 m)

System Accessories

Part No.	Description
222011	Ground wire for grounding pump and other components and equipment in the spray area. 12 gauge, 25 ft (7.6 m).
186118	English Warning Sign. Available at no charge from Graco.

Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests.Not for use in hazardous areas.
722886	Paint Resistance Meter. Use for fluid resistivity test. See manual 307263. **Not for use in hazardous areas.**
722860	Paint Probe. Use for fluid resistivity test. See manual 307263. **Not for use in hazardous areas.**
245277	Test Fixture, High Voltage Probe, and kV Meter. Use to test the electrostatic voltage of the gun, and the condition of the turbine and power supply when being serviced. See manual 309455. Also requires 24R038 Conversion Kit.
24R038	Voltage Tester Conversion Kit. Converts the 245277 Test Fixture for use with the Pro Xp Gun turbine. See manual 406999.

Gun Accessories

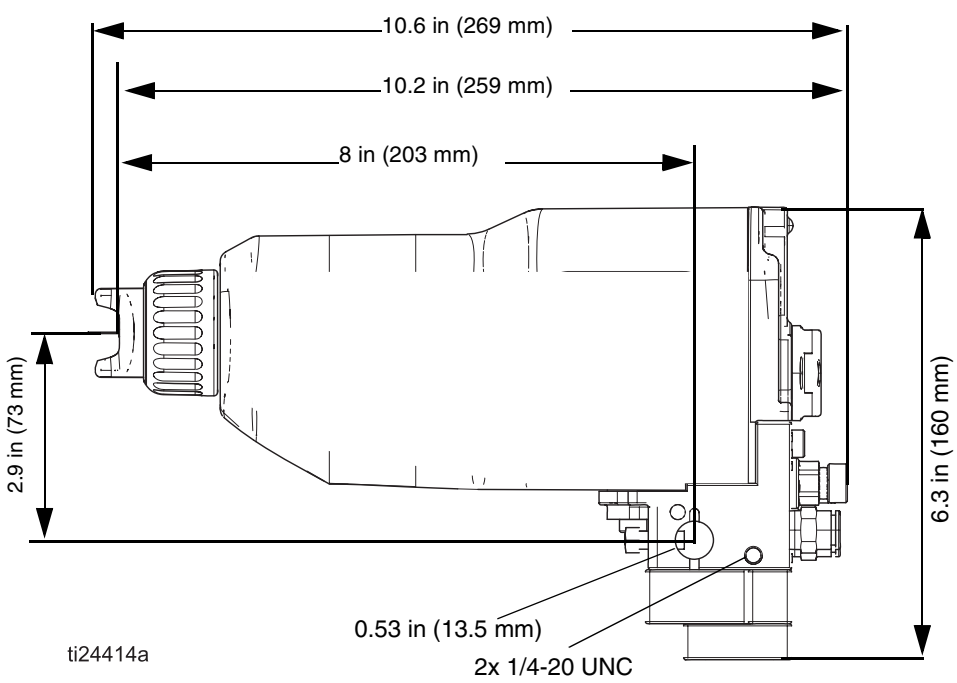
105749	Cleaning Brush
111265	Non-silicone Lubricant, 4 oz (113 g).
116553	Dielectric Grease. 1 oz (30 ml)
24V929	Gun Covers

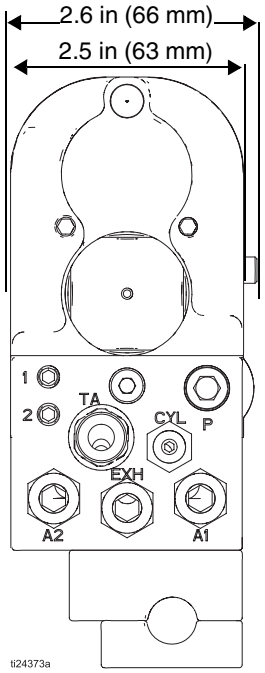
Conversion and Repair Kits

24N318	Round Spray Kit. To convert a standard air spray gun to a round spray air cap. See manual 3A2498.
24W390	Air Seal Repair Kit
24W391	Fluid Seal Repair Kit
24N706	Turbine Bearing Repair Kit

Dimensions

Rear Inlet Manifold





Technical Data

Pro Xp Auto Waterborne Air Spray Gun		
	US	**Metric**
Maximum fluid working pressure	100 psi	0.7 MPa, 7 bar
Maximum working air pressure	100 psi	0.7 MPa, 7 bar
Maximum air pressure at gun inlet	40 psi	0.28 MPa, 2.8 bar
Maximum fluid operating temperature	120°F	48°C
Paint resistivity range	3 megohm/cm to infinity	
Short circuit current output	125 microamperes	
Gun Weight (Approximate)	2.6 lb	1.2 kg
Voltage Output		
Standard Models	60 kV	
Smart Models	30-60 kV	
Noise (dBa)		
Sound Power (measured per ISO Standard 9216)	at 40 psi: 90.4 dB(A) at 100 psi: 105.4 dB(A)	at 0.28 MPa, 2.8 bar: 90.4 dB(A) at 0.7 MPa, 7 bar: 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi: 87 dB(A) at 100 psi: 99 dB(A)	at 0.28 MPa, 2.8 bar: 87 dB(A) at 0.7 MPa, 7 bar: 99 dB(A)
Inlet/Outlet Sizes		
Turbine air inlet fitting, left-hand thread	1/4 npsm(m)	
Atomizing air inlet fitting	5/16 in. OD nylon tube (8 mm)	
Fan air inlet fitting	5/16 in. OD nylon tube (8 mm)	
Cylinder air inlet fitting	5/32 in. OD nylon tube (4 mm)	
Fluid inlet fitting	1/4-18 npsm(m)	
Materials of Construction		
Wetted Parts	Stainless Steel; Nylon, Acetal, Ultra-High Molecular Weight Polyethylene, Fluoroelastomer, PEEK, Tungsten Carbide, Polyethylene	
Notes		
Loctite® is a registered trademark of the Loctite Corporation.		

Notes

Graco Pro Xp Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. However, any deficiency in the barrel, gun body, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months from the date of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS
The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

For the latest information about Graco products, visit www.graco.com.

For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.
Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.

Original instructions. This manual contains English. MM 333012

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA

Copyright 2014, Graco Inc. All Graco manufacturing locations are registered to ISO 9001.
www.graco.com
Revision B, December 2014